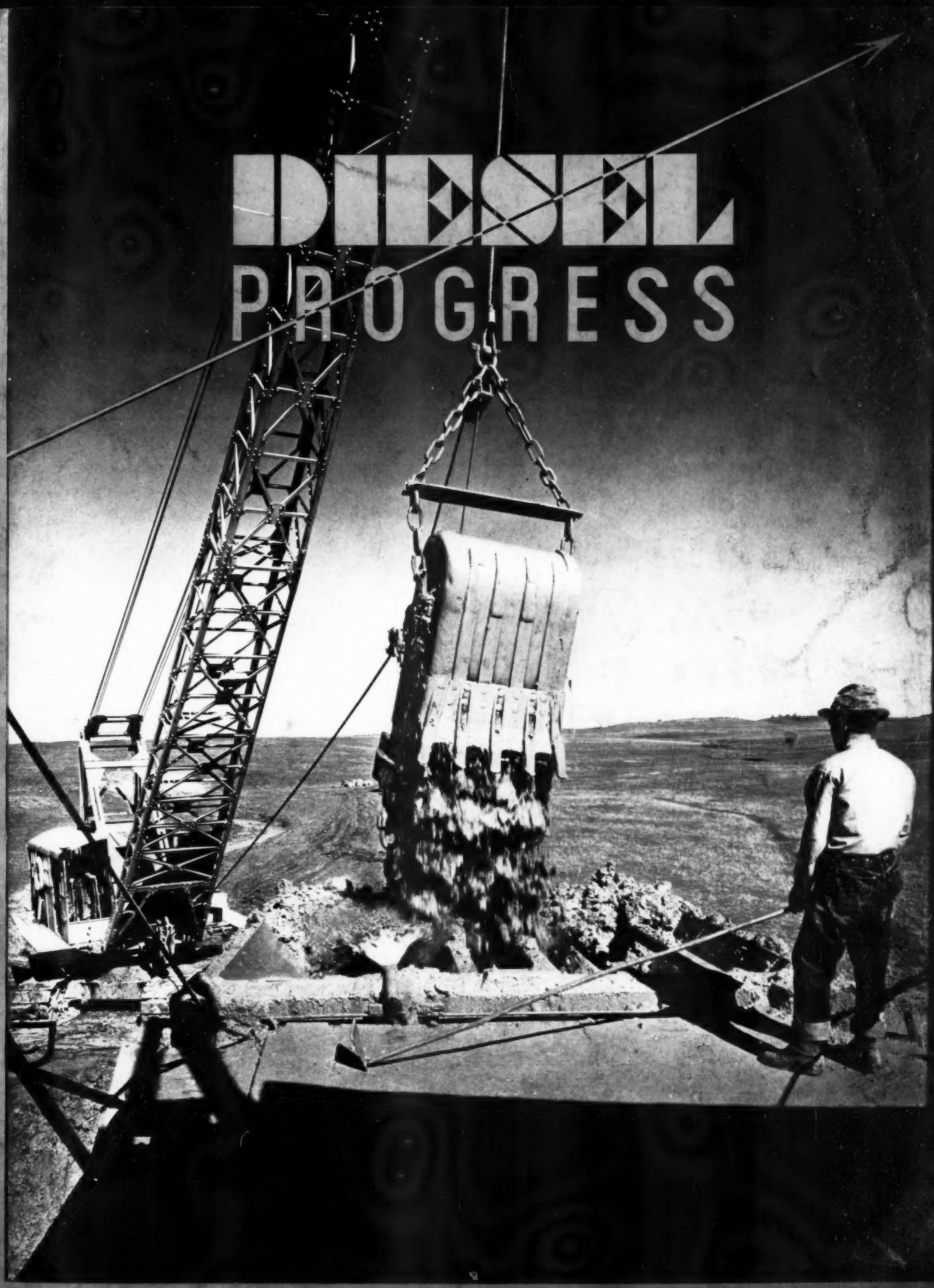
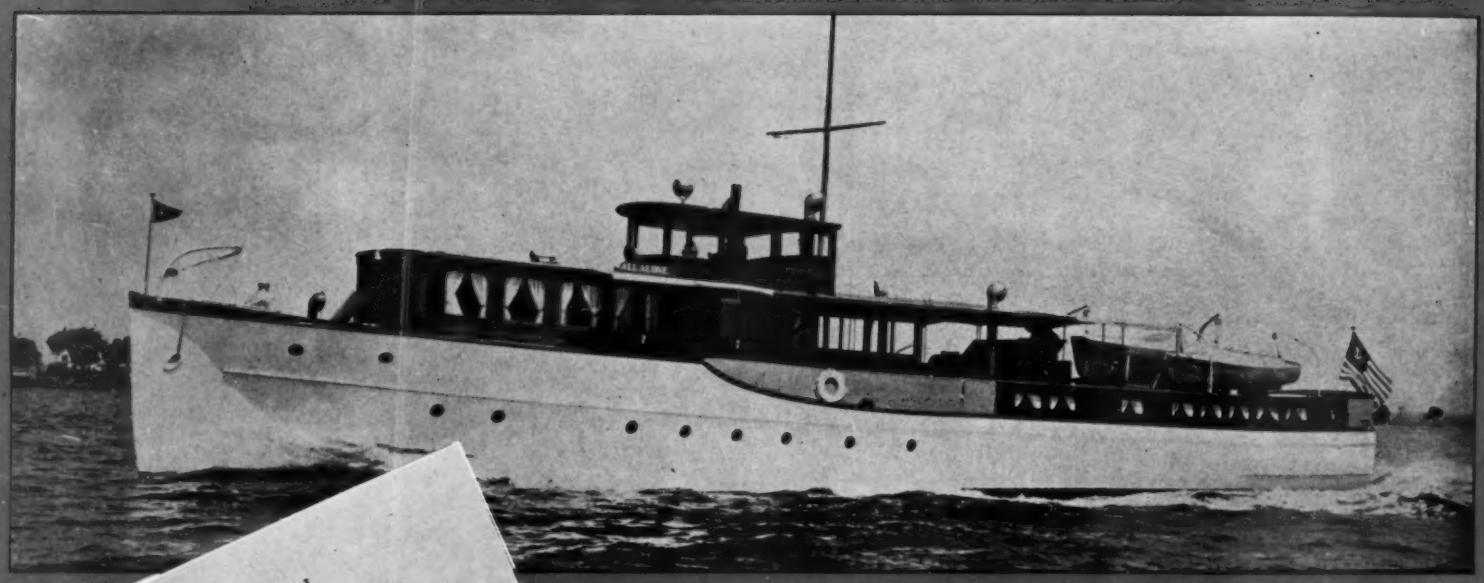
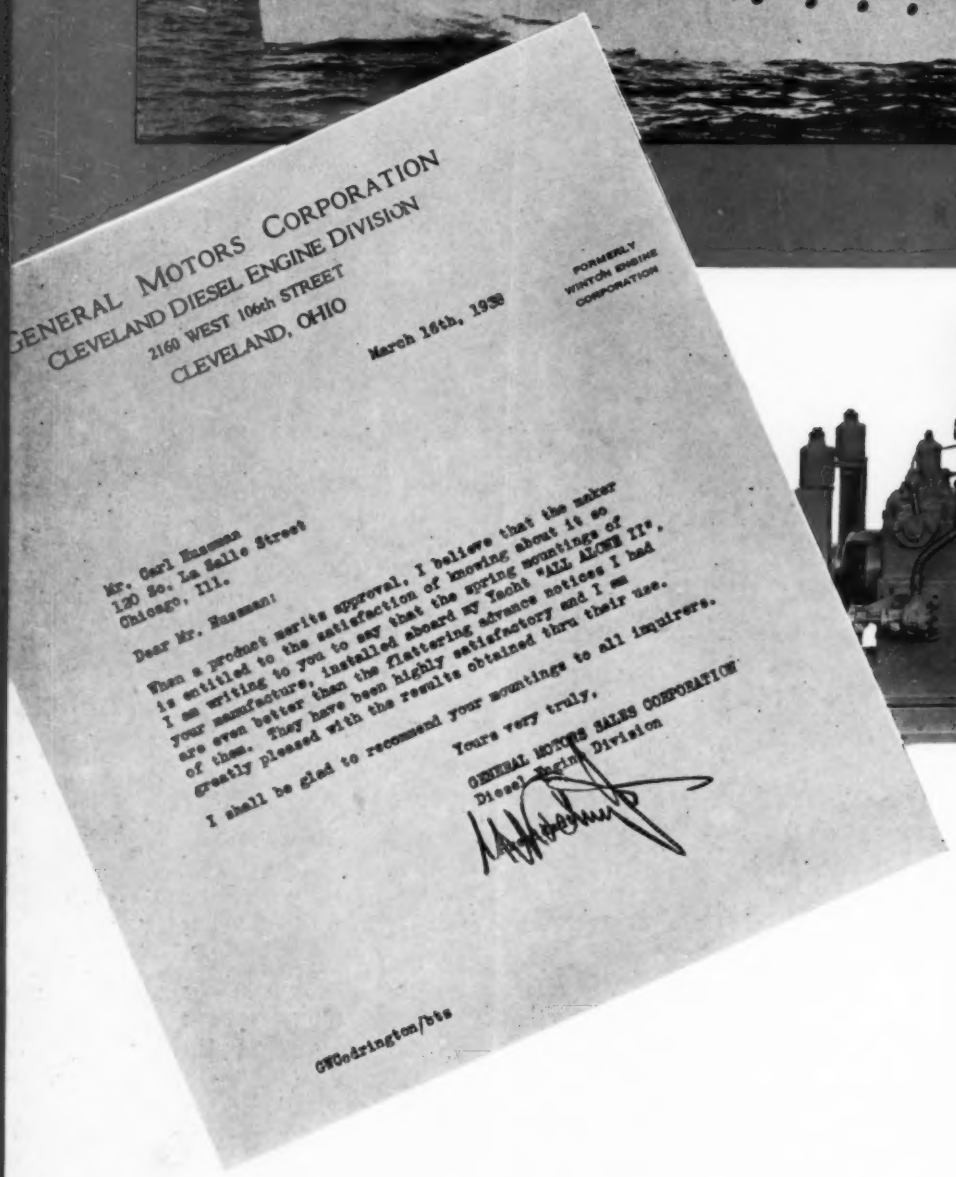
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



JUNE, 1938 CIRCULATION OF THIS ISSUE — IN EXCESS OF 14,000 COPIES 25c





GENERAL MOTORS CORPORATION
CLEVELAND DIESEL ENGINE DIVISION
2160 WEST 106th STREET
CLEVELAND, OHIO

FORMERLY WINTON ENGINE CORPORATION

March 16th, 1938

Mr. Carl Hussman
120 So. La Salle Street
Chicago, Ill.

Dear Mr. Hussman:

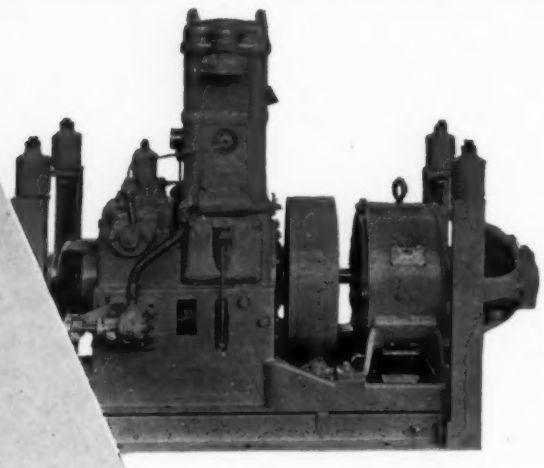
When a product merits approval, I believe that the maker is entitled to the satisfaction of knowing about it so I am writing to you to say that the spring mountings of your manufacture, installed aboard my Yacht "ALL ALONE II", are even better than the flattering advance notices I had of them. They have been highly satisfactory and I am greatly pleased with the results obtained thru their use.

I shall be glad to recommend your mountings to all inquirers.

Yours very truly,

GENERAL MOTORS SALES CORPORATION
Diesel Engine Division

GWCodrington/bts



One of the two auxiliary Diesel generating sets in use on Mr. George W. Codrington's yacht "*All Alone* II." Both units are mounted on **HUSSMAN** spring mountings.

Use Quickmail Coupon No. 31 when you send in the details of your problems.

The problems of vibration abatement solved in Mr. Codrington's case are typical of the work we are doing constantly. We specialize in research and in analysis. The elimination of machinery vibrations and noises represents a task which calls for individual treatment before a satisfactory solution can be guaranteed.

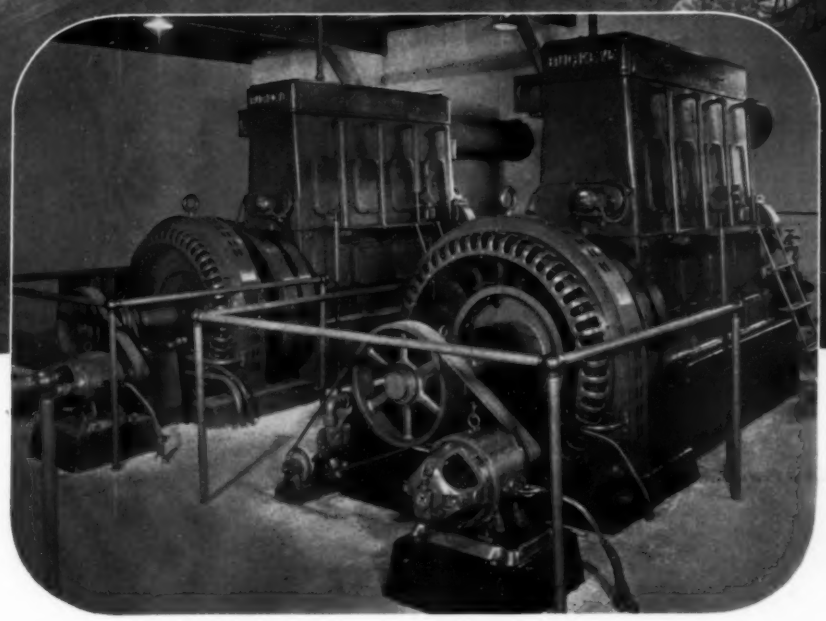
In an article on pages 40 and 41 of this issue will be found several case histories, problems which we have analyzed and successfully solved, both in marine and industrial Diesel applications.

Such problems of vibration or noise abatement as you may care to submit to us will be promptly and separately reported on—with a practical recommendation for their solution.

CARL HUSSMAN

Specialist in solving vibration problems

120 SOUTH LA SALLE ST., CHICAGO, ILL.



Install a

BUCKEYE DIESEL

and Save

40% to 70%

on Power!

The BUCKEYE Diesel is most economical and efficient because of seven features:

1. **Silent Watchman (Pat.)**
2. **Full pressure lubricating system.**
3. **Sleeve cylinders.**
4. **Exhaust and intake manifolds not bolted to cylinder head.**
5. **Reversible shell type silver alloy bearings.**
6. **Individual pumps for each cylinder.**
7. **Completely enclosed.**

Sizes: 40 H.P. to 600 H.P.

A BUCKEYE DIESEL CAN SAVE FOR YOU TOO!

BUCKEYE

A PAIR of 150 HP. 100 KW. Buckeye Diesel generator sets supply all the power for the Atlantic Beach Hotel and surrounding residences, stores, etc., in that community. Atlantic Beach is some fifteen miles from Jacksonville, Florida, and is now completely independent of outside source of power. The two Buckeye Diesels supply dependable, economical power all the time, day in and day out, year in and year out.

The Buckeye Diesel is fully described in our catalog 605. A request on your business letterhead will bring you a copy. ***Use Quickmail Coupon No. 3.***

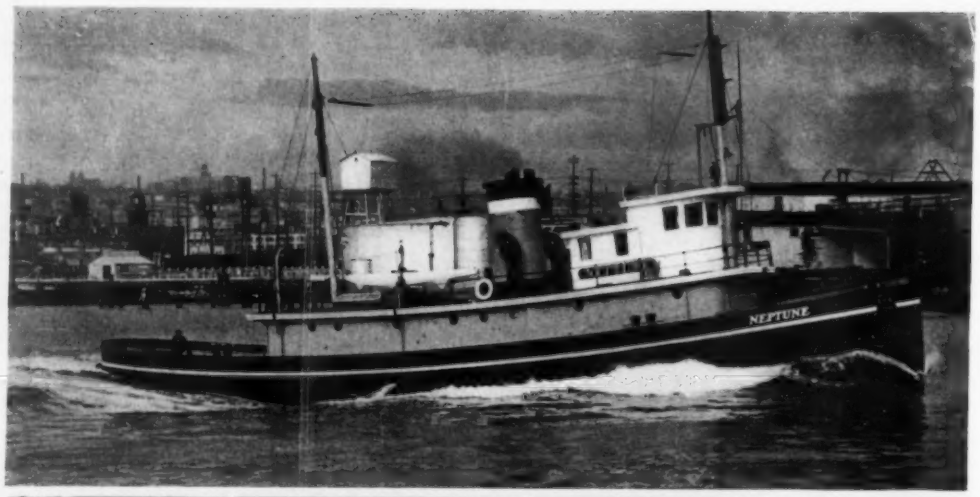
***Be* PROFITWISE *and* DIESELIZE *with* BUCKEYES**

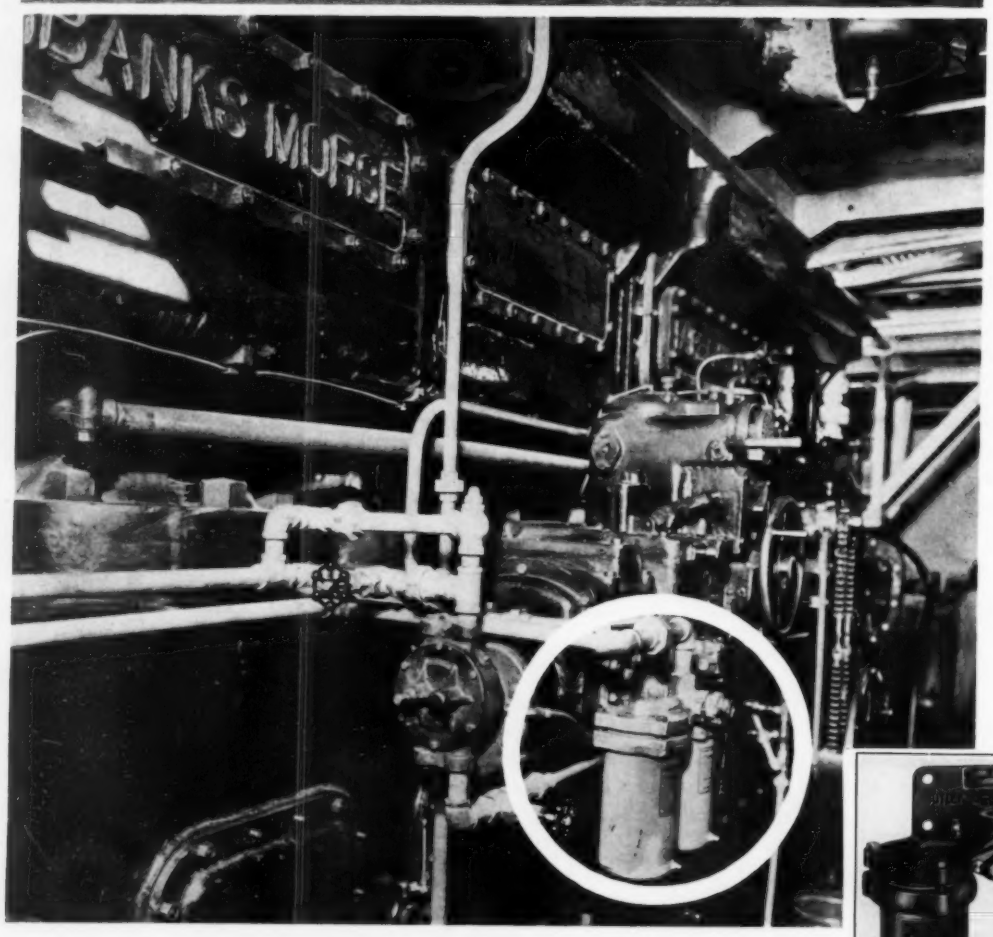
ENGINE BUILDERS SINCE 1908

The BUCKEYE Machine Co., LIMA, OHIO

DIESEL PROGRESS for June, 1938. Volume IV. No. 6. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 West Forty-fifth Street, New York, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1934, at Brooklyn, New York, authorized May 14, 1935. Subscription rates: United States and Possessions $3.00, Canada and all other countries $5.00 per year. Single copy price 25 cents in U. S. A., 50 cents for all other countries.

NUGENT





Main engine tug "Neptune" showing installation of Nugent Duplex Filters on fuel line.

FUEL OIL FILTERS

On Tug Neptune

Nugent Duplex Type 1116 LY No. 0 Fuel Oil Filters are installed on the 1050 hp. 6-cylinder Fairbanks-Morse 2-cycle trunk piston Diesel engine which forms the new power plant for the tug "Neptune" owned by the Puget Tug and Barge Company, Seattle, Washington.

The "Neptune" is now the largest single screw Diesel tug on the Pacific Coast.

NUGENT DUPLEX FUEL OIL FILTER with special woven, acid resisting, lintless textile element removes particles as small as .0004″.

Specify Nugent Fuel And Lubricating Oil Filters For Your Diesel Engines

SEND FOR BULLETIN 7A • USE QUICKMAIL COUPON No. 26

Wm. W. Nugent & Co., Inc. Mfrs.

Oil Filters, Oiling and Filtering Systems, Telescopic Oilers, Oiling Devices, Sight Feed Valves, Flow Indicators, Compression Union Fittings, Oil Pumps, Etc.

415 N. Hermitage Ave. Established 1897 Chicago, U. S. A.

Most Powerful Tug on Pacific Coast

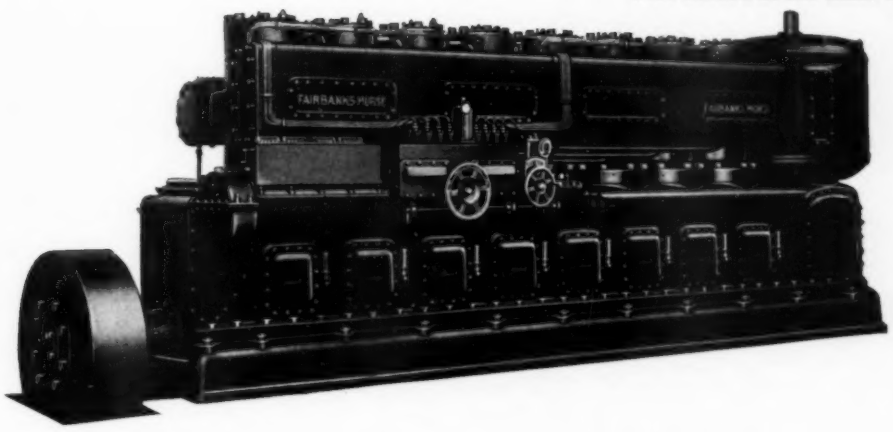
IS DRIVEN BY

FAIRBANKS-MORSE DIESEL

NEPTUNE Shows Better than 13 Knots on Trial Trip; Owners Pleased by Change from Steam to Diesel Power

When the tug boat NEPTUNE pulled away from the pier on her trial trip early in April, she gave Seattle's maritime world another red-letter date.

About a year ago the NEPTUNE, then known as the *R. M. Woodward*, was purchased from the United States Government by the Puget Sound Tug & Barge Company. She was then powered by steam. Later in the year, the steam engine was removed and a Fairbanks-Morse Model 37 six-cylinder Diesel installed. The trial trip was more than pleasing to the company officials who were aboard at the time. The NEPTUNE showed a speed of better than 13 knots an hour on the trial run—and, since the installation of her new F-M Diesel power plant, she is the most powerful tug on the Pacific Coast. She has an all-steel hull, is 115 feet long, 24 feet in the beam, and has a depth of 12 feet.



The NEPTUNE *is powered by an F-M Model 37 six-cylinder Diesel. The Model 37 is a two-cycle mechanical injection type and operates on the full Diesel principle. It embodies such construction features as oil-cooled pistons, open head combustion, differential injection valves, and backflow scavenging*

No matter what type of craft you have, if you want the most economical and dependable power plant for it, see Fairbanks-Morse. F-M Marine Diesels are not adaptations of automotive designs. They are marine Diesels from the bedplate up. And Fairbanks-Morse builds the type of power plant best suited to *your individual needs*. You need make no compromise. Write Fairbanks, Morse & Co., Department 23, 600 S. Michigan Ave., Chicago, Ill. And 35 cities throughout the United States—a service station at each branch.

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DIESEL ENGINES
PUMPS
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FAIRBANKS SCALES
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RADIOS
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FARM EQUIPMENT
STOKERS
AIR CONDITIONERS

F M

Diesels

RING-FREE AT WORK ON THE *New York World's Fair!*

On this World's Fair main trunk line sewer job, RING-FREE not only improved the performance of its equipment but also simplified their oil problems . . . because RING-FREE does its lubricating job equally well in every type of motor {diesel, gasoline or natural gas} that uses motor oil.

Let the Macmillan Man prove this simple fact . . . *in your own* equipment.

MACMILLAN RING-FREE MOTOR OIL

1. GREATER FILM STRENGTH
2. HIGHER HEAT RESISTANCE
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4. FASTER PENETRATION
5. REMOVES HARD CARBON
6. IS NOT CORROSIVE

TELEPHONE MINNESOTA 9-8464

CHAS. F. VACHRIS, INC.
GENERAL CONTRACTORS
827 REMSEN AVENUE
BROOKLYN, N. Y.

April 27, 1938

Macmillan Petroleum Corporation,
50 West 50th Street,
New York, N.Y.

Gentlemen:

In the event of placing our fourth ten drum order of Ring-Free Oil, I decided that I was going to write a letter and give a little credit where I know it is due.

Repeatedly in the last year while we have been using Ring-Free, my engineers and mechanics have commented on increased performance, much less carbon, little if any sludge and also saving of both fuel and gasoline in our diesel and other equipment.*

When the Macmillan man came to us we were contracted and well set on what we wanted to use and had very little thought about any changes. But along with my men's very good reports, I want to add that having one oil that will serve each and every lubricating need, that I have on this World's Fair main trunk line sewer job, is an asset, both from the standpoint of stock and bookkeeping.

I am not much of a letter writer, but the thought came to me, that you might like to use this report, so I want to say that you are very welcome to do so if you so choose, and I will gladly recommend Macmillan Ring-Free to Contractors or anyone whose equipment must do continous, heavy duty work such as we have on this job.

Thanking you again for having brought Ring-Free Oil to our attention I remain.

Very truly yours,

Anthony F. Vachris.

*VACHRIS USES RING-FREE IN
3 — 1¼ yd. North Western Drag Lines with Wisconsin Gas Motors
1 — North Western Truck Crane with V-8 Motor
1 — Caterpillar RD 8 Diesel
1 — Cletrac Eighty Diesel
3 — Moretrench Ditchers with Hercules Motors
6 — Dump Trucks (Macks, Fords and Brockways)
2 — Ingersoll-Rand 300 cu. ft. Compressors
Several small Homelite pumps.

MACMILLAN PETROLEUM CORPORATION

50 W. 50th St., New York ● 624 S. Michigan Ave., Chicago ● 530 W. 6th St., Los Angeles

Use Quickmail Coupon No. 8

He Finishes the Bore to a Tolerance

ONE SIXTH the THICKNESS of this paper

WILSON Gould finishes the bore and keyway of a G-E generator to a tolerance one sixth the thickness of this sheet of paper. His care in working to precise measurement is typical of the skilled craftsmanship that goes into G-E generators.

He and his fellow workmen take pride in this fine workmanship—pride that is reflected in the efficient performance records of some 40 million kw of G-E generators in service. By scraping the generator bore to such a close tolerance, Gould assures accurate press fit of the generator on the shaft.

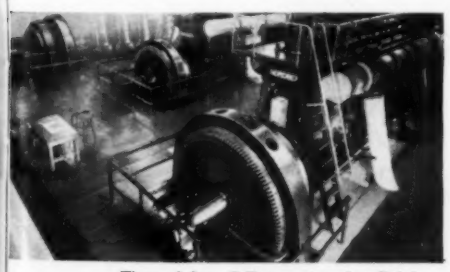
Remember Wilson Gould and his careful craftsmanship when you specify a generator. Pride in such craftsmanship on the part of the men who build your generator is one of your assurances that it will give you high efficiency and require little maintenance. General Electric, Schenectady, N. Y.

WILSON H. GOULD

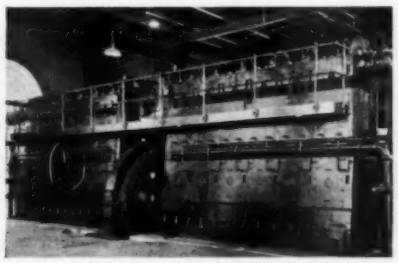
An old-timer in the building of G-E generators, Wilson Gould began work with General Electric in 1888. Except for a few years in business for himself, he has been in generator production ever since. His work on generators has helped provide light and power for millions of people.

With baseball his favorite hobby, the Yanks his favorite team, Wilson Gould was relieved when Joe DiMaggio, leading homerun hitter in 1937, signed his '38 contract with the Yanks. Not just a major league enthusiast, Gould is an ardent rooter on the sandlot diamond near his home.

For information on any type of electric equipment, use Quickmail Coupon No. 00

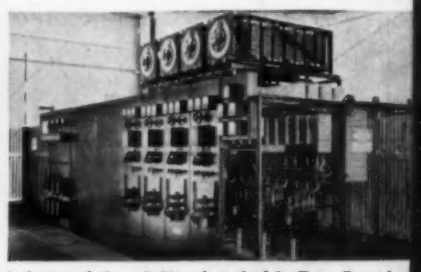


Three of four G-E generators installed in a municipal power station. Their efficiency led to the recent installation of the fourth



One of several G-E generators in a Texas cement plant. The one shown here is of 1663 kva at 225 rpm

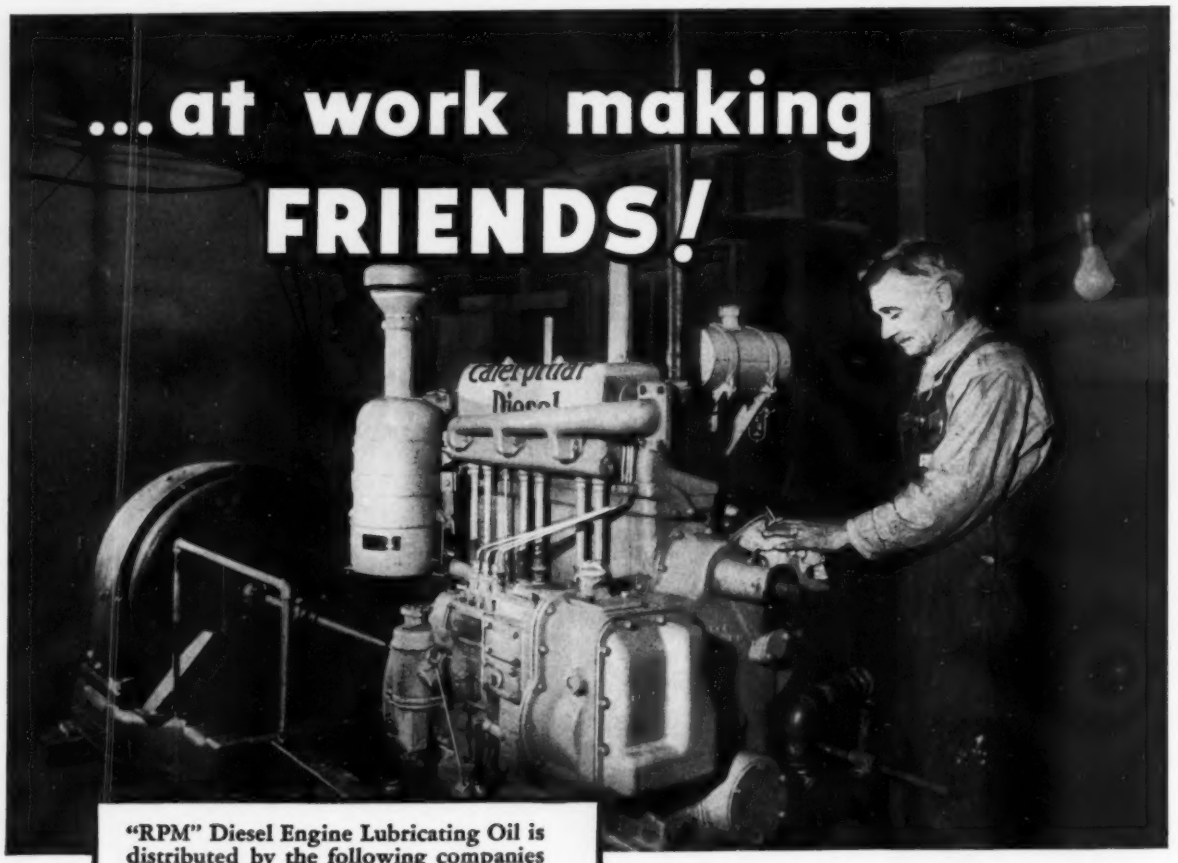
Two of four G-E generators, of 625 kva each at 327 rpm, in the power station of a refinery. The switchboard in the background is also General Electric



A close-up of the switchboard at the left. From General Electric you can obtain switchgear, voltage regulators, and cable, as well as generators, for your plant

GENERAL ELECTRIC

040-55



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"RPM" Diesel Engine Lubricating Oil:
THE CALIFORNIA COMPANY (Montana only)
THE CARTER OIL COMPANY, Tulsa, Oklahoma
HUMBLE OIL & REFINING COMPANY
STANDARD OIL COMPANY (Indiana)
STANDARD OIL COMPANY (Inc. in Kentucky)
STANDARD OIL COMPANY (Nebraska)
STANDARD OIL COMPANY OF CALIFORNIA
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Diol "RPM" Diesel Engine Lubricating Oil:
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STANDARD OIL COMPANY OF PENNSYLVANIA

Signal "RPM" Diesel Engine Lubricating Oil
SIGNAL OIL COMPANY

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"RPM" Diesel Engine Lubricating Oil:
IMPERIAL OIL LIMITED
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THROUGHOUT THE WORLD

"RPM" Diesel Engine Lubricating Oil is also available through distributors in more than 100 other countries.

"RPM" Diesel Engine Lubricating Oil makes friends on every job it tackles! Hoberg Bros., Hoberg, California, report: "....regarding.... stationary Model D 66 'Caterpillar' Diesel Engine. This installation was made during May of 1937....we expect to run the motor another season without any mechanical adjustments.... we were very much gratified at the results obtained from the use of this unit....and the lubricating oil."

(Signed) HOBERG'S RESORT
George G. Hoberg

RPM
REG. U.S. PAT. OFF.
DIESEL ENGINE LUBRICATING OIL

Approved by
CATERPILLAR TRACTOR CO.

STANDARD OIL COMPANY OF CALIFORNIA

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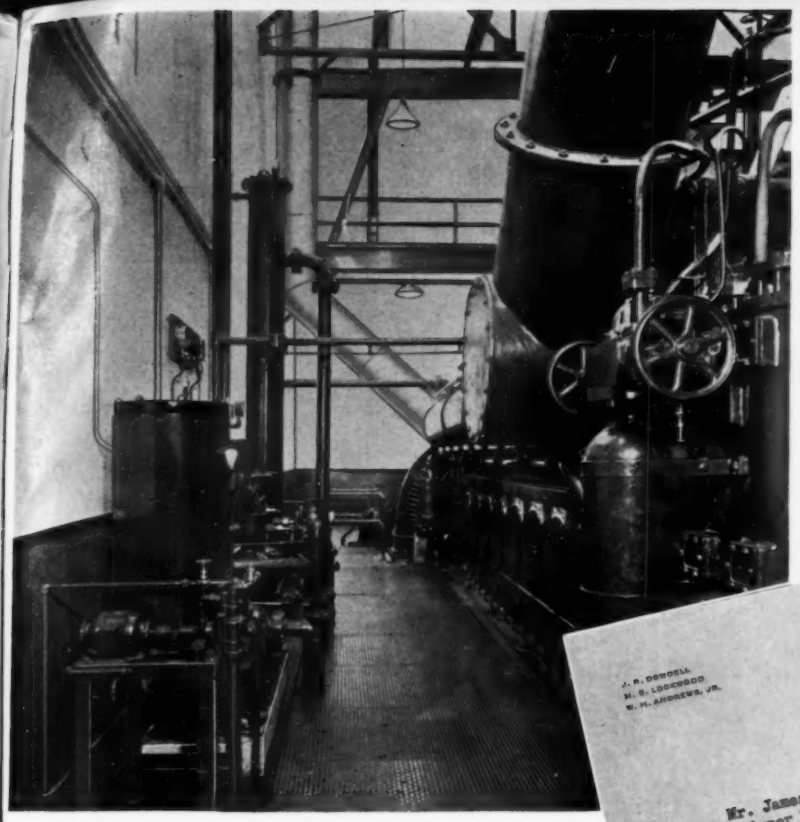
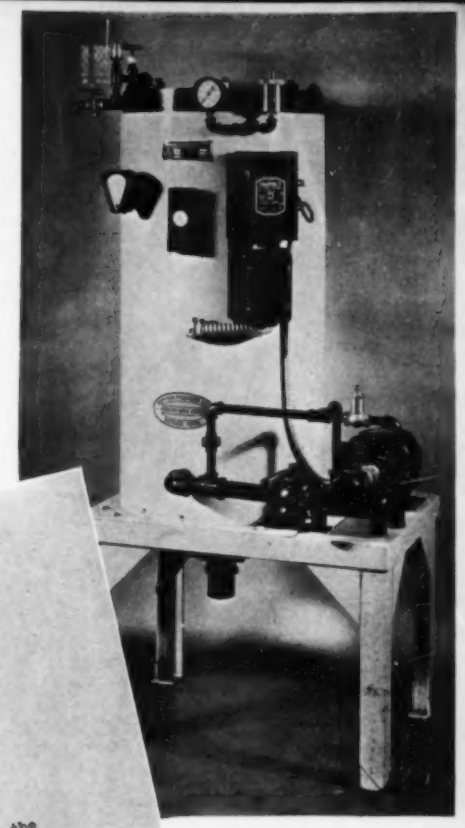


1000 H.P. Busch-Sulzer engine at Texas Star Flour Mills with positive control of lubrication by using the SKINNER SUPER FILTER.



How leading consulting engineers regard this Super Filter.

DOWDELL, LOCKWOOD & ANDREWS
ENGINEERS
HOUSTON-DALLAS

J. R. DOWDELL
H. S. LOCKWOOD
W. H. ANDREWS, JR.

May 12, 1938

Mr. James H. Skinner
Skinner Purifiers Inc.
2231 Dalzelle Street
Detroit, Michigan

Dear Mr. Skinner:

I have just returned from a visit to the Texas Star Flour Mills Plant at Galveston, Texas, and I am pleased to advise you that the two Model PE-19 Skinner Purifiers installed on their two 1000 HP Busch-Sulzer Diesel Engines are continuing to render a very satisfactory service in keeping their lubricating oil clean and in a good condition. Samples of the lubricating oil was just recently analysed and the results indicated that each purifier was performing in a manner as represented by you and your representative, Mr. J. M. Ravenna.

We want to assure you that it is most certainly a pleasure to transact business with a firm whose equipment will perform in a manner as represented. Although we have had no occasion to call upon you for service in the several months that our client has used these two purifiers, your Mr. Ravenna has visited the plant at regular intervals as a matter of routine inspection to check the operation of the purifiers and to answer any questions which might be raised by the plant operators.

In view of the pleasant experience which we have had with your equipment, we will have no hesitancy in recommending it to any users of internal combustion engines.

Very truly yours,

J. R. Dowdell

JRD:O

SKINNER
SUPER FILTER

The Skinner **Super Filter furnishes you positive control of the purity of the lubricating oil in your engine. It is accomplished by removing all harmful impurities from the lubricating oil—continuously purifying sufficient oil in your engine to remove these contaminants as rapidly as they build up in the lubricant.**

The filtering operation is fully automatic and extremely simple, accomplished by the finest mechanical filtration known. The cleaning of the filter only requires a reversal of air pressure through the unit. Units of the proper size are available to take care of any size or type of Diesel installation.

The outstanding service rendered by the Skinner Super Filter in the plant of the Texas Star Flour Mills installation is but typical of what you can expect in your own plant.

Use Quickmail Coupon No. 28

SKINNER PURIFIERS Inc.

2231 DALZELLE STREET • DETROIT, MICHIGAN

6600 HORSEPOWER OR 125

ALUMINUM SERVES BOTH

6600 Diesel horsepower are represented by this streamliner, "City of Los Angeles"; 5400 in the six engines of the 3-car locomotive, and 1200 in the two that supply power for auxiliaries. The Diesel engine that powers the tractor is rated at 125 H.P.

Pistons in these Diesel engines, big and little alike, are Lynite, selected because they run more miles without requiring attention. Their lighter weight reduces bearing pressures, giving longer bearing life. The superior heat-conducting property of Aluminum provides better heat distribution and assures longer piston life.

Aluminum proved valuable in reducing over-all weight of Diesels in the train's main power plant, of those supplying power for auxiliaries, and in the tractor engine. Aluminum is likewise useful where trailing loads must be reduced.

Our engineers will gladly help you determine how Alloys of Alcoa Aluminum can best serve you. ALUMINUM COMPANY OF AMERICA, 2141 Gulf Building, Pittsburgh, Pa.

ALCOA · ALUMINUM

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. . . in a simple,

common sense way . . .

the YM OIL PURIFIER

removes fuel dilution, acids, dirt, tarry material, sludges, water, restores new oil appearance

and is the easiest preventive for stuck piston rings, excessive make-up oil consumption, the periodic junking of used oil . . . *and* keeps crankcase parts clean and bright

● THERE IS A CORRECT SIZE ●
for EVERY PLANT, LARGE or SMALL

USED BY A NATIONWIDE ROSTER OF SUCH DISCRIMINATING BUYERS AS:

Illinois Central Railway	U. S. Navy Bureau of Aeronautics
Erie Railroad	Tweedie Footwear Co.
Inland Steel Company	Amer. Liberty Pipe Line
Parke, Davis & Company	City of Denton, Texas
Inland Utilities	City of Higginsville, Mo.
Ward Ice Company	City of Cherokee, Okla.
Delaware N. J. Ferry Co.	City of Grand Haven, Mich.
Moran Towing & Trans. Co.	City of Lake Mills, Wis.
Ira S. Bushey & Sons Co.	City of Tipton, Indiana
Staten Island Coach Co.	

USED OIL BEFORE AND AFTER PASSING THRU A Y-M OIL PURIFIER

● The body of the oil has been restored through elimination of fuel dilution, and new oil appearance is imparted by complete removal of tarry material and dirt.

● Destructive acidity has also been eliminated from the used oil.

THE YOUNGSTOWN MILLER CO.,
SANDUSKY, OHIO

6

Electric current available . . . . . Volts A.C. or D.C.

Main Engines

H.P.	MAKE	TYPE	LUBE OIL CAPACITY

Gals. drained—trucks and cars.....per mo.

Gals. other oils to be reclaimed.....per yr.

Name.....

Address.....

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Use Quickmail Coupon No. 15 on your envelope

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Superior DIESELS

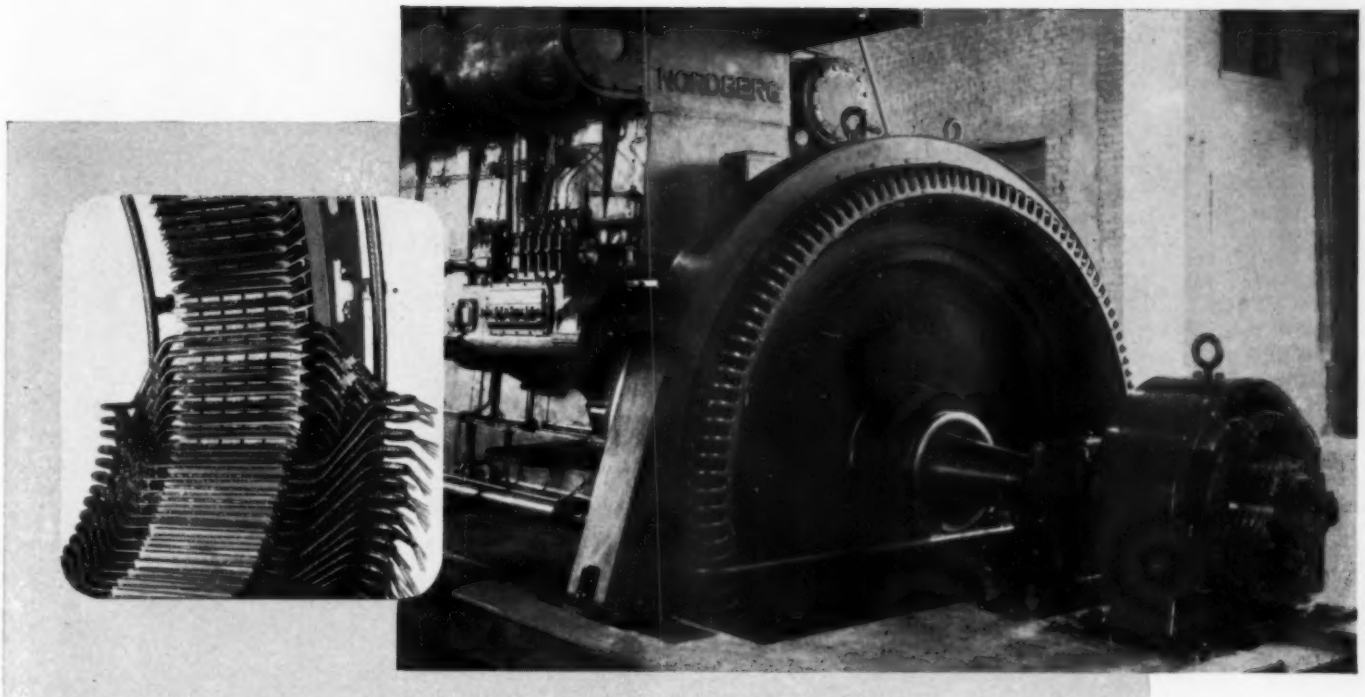
UNDER THE BANNER OF

"The Flying Red Horse"

Two propulsion engines—two auxiliary generating sets—one cargo pump unit—100 per cent Superior powered is the "KANSAS CITY SOCONY."

THE NATIONAL SUPPLY COMPANY . . . SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa. · SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas.



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for Lifetime Operation

Both frame and rotor are fabricated from structural steel. This is used because it is best able to withstand the mechanical requirements of Diesel engine operation.

The finest of insulating materials go into the making of the windings. Then the insulation is checked by standard A.I.E.E. tests, and double-checked by the Westinghouse high frequency test. Flawless insulation is the result.

Electrical characteristics of each Westinghouse Generator are matched to the Diesel drive, to give maximum efficiency of conversion. Ample natural ventilation circulates sufficient air to give even temperatures throughout the windings.

GET THIS FREE BOOK

"A.C. GENERATORS FOR DIESEL ENGINE DRIVE", a new booklet, describes Westinghouse Generators and auxiliaries designed especially for this service. It tells you what to look for when purchasing equipment of this type. Send for your copy today. Use Quickmail coupon 9.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, EAST PITTSBURGH, PENNA.

J 10074

Westinghouse A·C GENERATORS *for Diesel Engine Drive*

SWITCHGEAR VOLTAGE REGULATORS EXCITERS AUXILIARY MOTORS AUTOMATIC CONTROL

ERIE

Leading engine builders rely on Erie Forge experience and complete facilities for the manufacture of crankshafts and other forged parts, finished to the most exacting tolerances.

AT

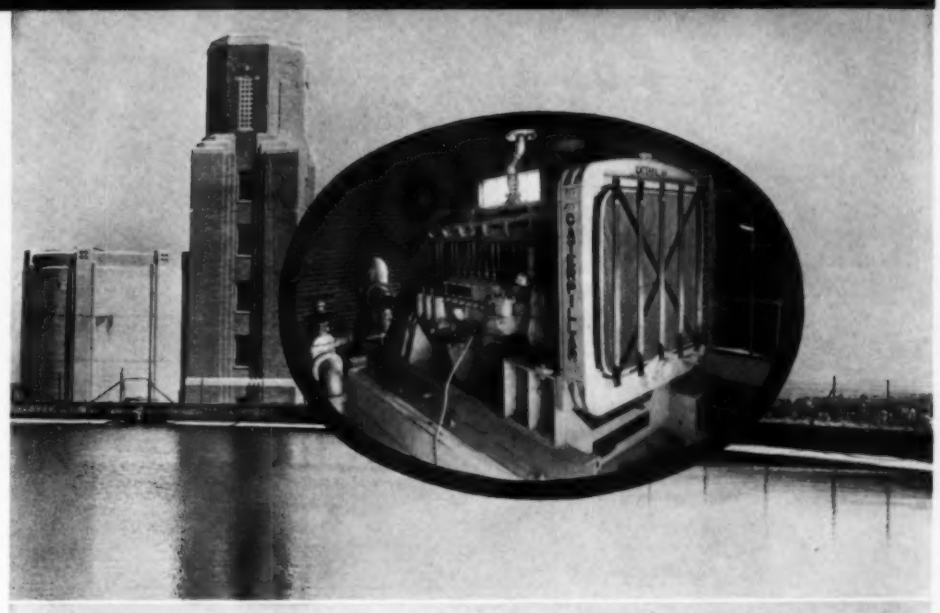
MADISON, S. D.

The remarkably successful municipal Diesel plant at Madison, South Dakota, which is described in detail on pages 36, 37 and 38 of this issue, is a great credit to Busch-Sulzer Bros. Diesel Engine Co. who supplied all of the engines for this plant. We are proud to have had the opportunity of supplying Erie crankshafts for engines three and four installed in 1920 and for engine number five installed in 1928.

ERIE FORGE COMPANY

ERIE, PENNSYLVANIA

"WE MUST HAVE WATER!"



WHETHER from crops or communities, the call for water is unending. And where pumps are needed to keep it answered, dependable power is a vital consideration. That is why "Caterpillar" Diesel Engines are more and more the choice in power-plants for irrigation projects and municipal water-supply systems.

The City of Lexington, Va., for example, uses the 125-horsepower "Caterpillar" Diesel Engine shown in upper picture to drive a Cook deep-well pump 24 hours a day during dry spells.

Near Madera, Calif., the 60-horsepower "Caterpillar" Diesel Engine in lower picture drives a Pomona deep-well pump supplying 2000 gallons of irrigation water per minute—at a fuel cost of only 10⅛c an hour.

These installations are typical of many and an indication of the wide range of applications and conditions to which these highly developed engines can be adapted. Indoors or out, warm or cold, full load or partial—they go along hour after hour, day after day—asking little attention, incurring little maintenance expense, using little fuel.

"Caterpillar" Diesel Engines offer the same matchless economy and efficiency to the users of power in any field and to the manufacturers of powered equipment of most every kind. *Nine sizes—32 to 160 horsepower.*

CATERPILLAR TRACTOR CO., PEORIA, ILL.

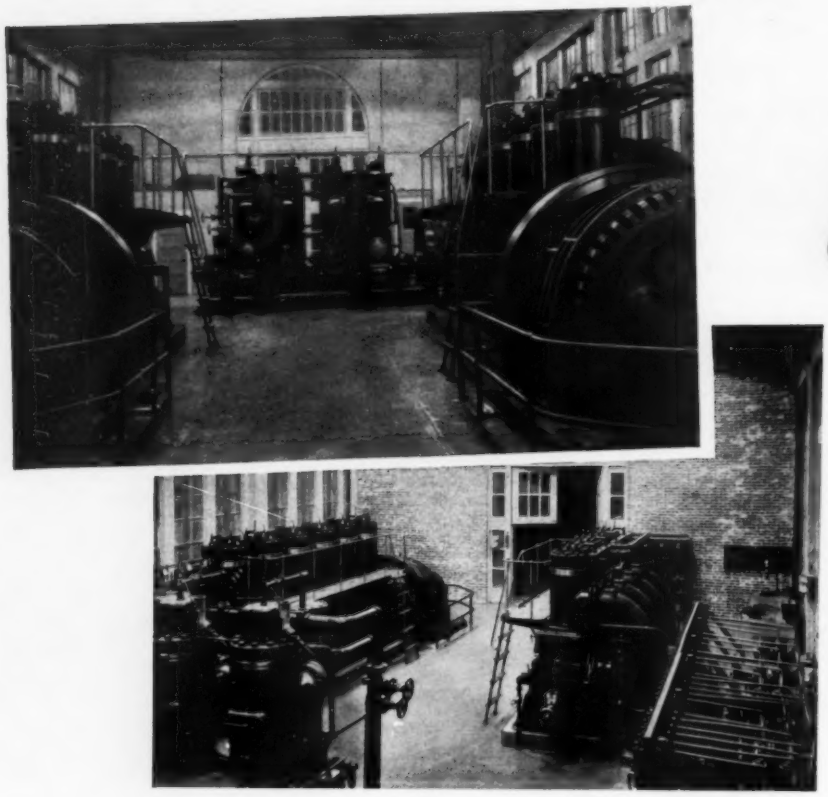
CATERPILLAR DIESEL POWER

REG. U.S. PAT. OFF.

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

LAKEVIEW, OREGON PLANT

(California Public Service Co.)



Three of the four Fairbanks-Morse stationary Diesels that give California Public Service a total of 1250 b.p. Following the recommendations of their manufacturer, these Diesels are all lubricated with Texaco Ursa Oil.

AN *Efficient* OPERATION

A view of the California Public Service Plant at Lakeview, Oregon. Like many well-known Diesel plants, C. P. S. uses Texaco Ursa to help keep maintenance down, *power output* up!

ENGINEERS at this prominent West Coast central station know that its four Fairbanks-Morse Diesels will deliver full rated h.p. *indefinitely* . . . they're lubricated with Texaco Ursa Oil.

With this oil in continuous use, each inspection shows valves active, ports open, the entire engine clean. What little carbon forms is soft, fluffy, blows harmlessly out the exhaust.

Reports like this—from operators who have proved to themselves what Texaco Ursa Oil does in actual service—show why . . .

more stationary Diesel h.p. in the United States is lubricated with Texaco than with any other brand.

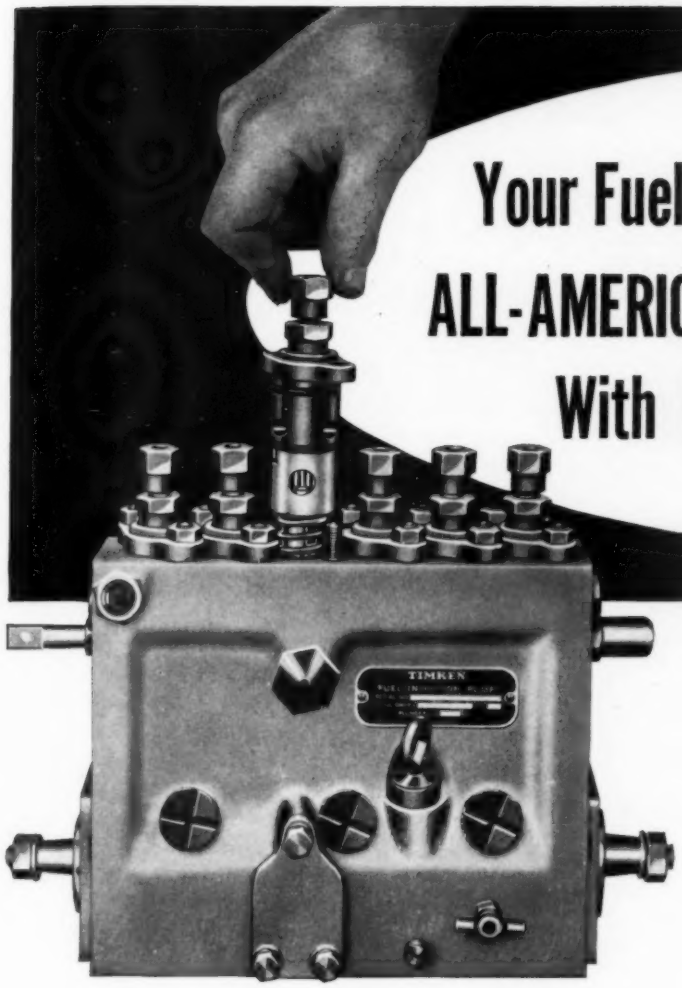
Trained lubrication engineers are available for consultation on the selection and application of Texaco Ursa Oil for Diesels and compressors. Prompt deliveries assured through 2108 warehouse plants throughout the United States.

The Texas Company, 135 East 42nd Street, New York City.

TEXACO

TEXACO *URSA OIL*

FOR DIESELS



Your Fuel Oil Burning Engine Needs This ALL-AMERICAN FUEL INJECTION EQUIPMENT With Renewable Pumping Units

TIMKEN Fuel Injection Equipment is a product of American enginering, American precision manufacturing and American raw materials—a combination that cannot be excelled. It can be applied to any type of fuel oil burning engine with highly gratifying results in performance, dependability and economy.

Renewable Pumping Units Simplify Maintenance—Prevent Delays

The pumping mechanism of the TIMKEN Fuel Injection Pump is in the form of individual pumping units—one for each engine cylinder—each unit completely self-contained. Any pumping unit can be renewed and replaced independently of the other units. Thus, it seldom is necessary to remove the pump from the engine. By having spare pumping units on hand the operator can keep the pump working at full efficiency and thereby greatly reduce operating delays. TIMKEN Fuel Injection Equipment is manufactured by one of the world's most famous engineering-manufacturing institutions—a large, financially-strong and fully responsible all-American company that assures your satisfaction. Write for further information. If you are an engine operator mention the make, model, H.P. and number of cylinders of your engine.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TIMKEN
FUEL INJECTION EQUIPMENT

PUROLATOR-PROTECTION *means clean oil...*
and more dependable operation for Diesel engines of every size

Dirt is the greatest single danger to Diesel operation. Dirt is dangerous because it impairs the efficiency of the lubricating oil . . . and because it is a potential source of serious damage to that delicate and expensive part, the injection system. When you consider that the injection system represents more than half the cost of many Diesel engines, you realize the importance of keeping dirt *out*.

Purolator offers a complete line of filters to do the cleaning job in the most economical and efficient way. Purolator engineers are constantly engaged in development work to provide positive protection for old and new Diesel types. Your inquiry will receive immediate and sincere attention. Motor Improvements, Inc., Newark, New Jersey.

Purolator for Lubrication

Type OB-9M Purolator assures freedom from impurities in the lubricating oil. In this unit, a knife is made to revolve about a stationary metal element, shearing off all accumulated dirt from the surface. This dirt drops to the bottom of the case. There it can be easily removed by means of the drain plug provided. This unit is one of many special designs developed for lubricating oil filtration.

Purolator for the Fuel Line

Type D-48JJ-3 Purolator is designed for successful handling of fuel filtration where there are no shut-down periods. Two identical units (with knife-edge cleaning elements) are mounted with a two-way shut-off control. Either unit may be cut out of service for cleaning without disturbing the operation of the other.

Like other Purolator fuel filters, Type D-48JJ-3 provides safe protection against clogging in the injection system.

PUROLATOR

The Oil Filter

LESS WEIGHT *HERE*... MORE POWER *HERE!*

The G M Diesel introduces a welcome new power-to-weight ratio in Diesel-Electric Drives

MORE power per pound—than even previous Diesel-Electric Drives could deliver—that's one of the many new major benefits that GM Diesel Power brings to marine operators everywhere.

Responsible is the new GM 2-cycle principle of Diesel Engine design—a principle that eliminates excess bulk, weight and cost, makes the great economies of Diesel-Electric Drive more widely available than ever before.

Now, practically all ocean-going vessels and fresh water craft—up to 9,000 deadweight tons—can take advantage of the lower operating costs, greater safety, and more flexible machinery arrangements that result from a change-over to Diesel-Electric Drive.

For under this new General Motors development, the Diesel Engine has become more readily and more economically adaptable to marine applications of almost every sort.

Yet GM Diesel economies aren't confined to operating costs alone. Every GM Diesel Power user is certain that his ships are held to an absolute minimum of idle time for service and repairs. For General Motors, in keeping with the policy of its predecessor Winton, not only manufactures and installs its Diesel-Electric units — but maintains responsibility for their continued servicing, as well.

Look over the complete range of GM Diesel Power units in the panel at the right. Among them there is almost sure to be the right GM Diesel for you.

FOR ALL MARINE USES—GM DIESELS

☆ Towboat units ☆ Self-propelled barges ☆ Inland waterways tankers ☆ Main ship propulsion, in multiple units ☆ Auxiliary power plants

W

GM DIESEL POWER

FORMERLY WINTON

GENERAL MOTORS

SALES CORPORATION

DIESEL ENGINE DIVISION • Cleveland, Ohio

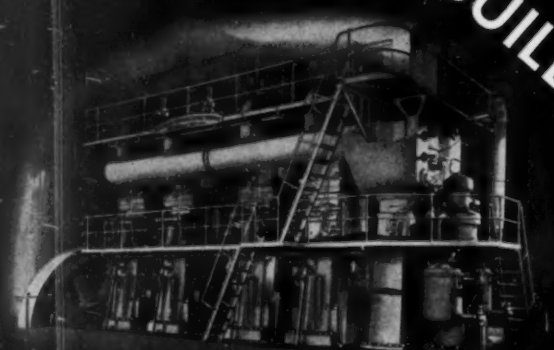
NORDBERG

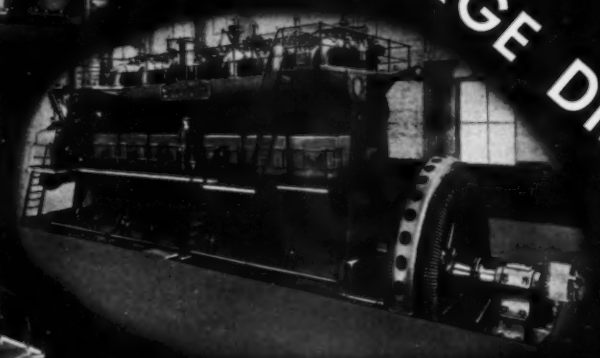
AMERICA'S FIRST BUILDER OF LARGE DIESEL ENGINES

1915—Five cylinder engine of 1250 H. P.

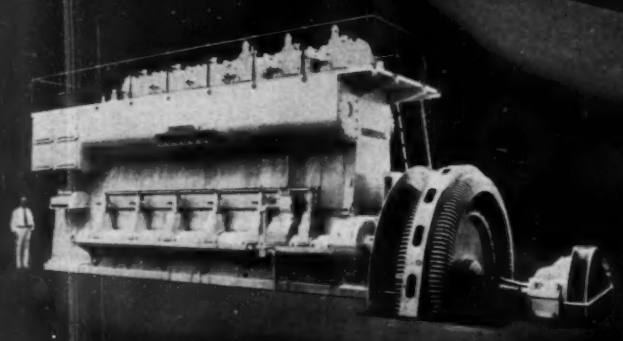
1916—A 1250 H. P. air compressor unit.

1919—A larger engine of 2250 H. P.





1924—Size stepped up to 4000 H. P.



A LARGE NORDBERG DIESEL OF TODAY

Nordberg four cycle engines are available up to 1000 H. P.; two cycle from 750 H. P. upward.

The first Diesel Engine built by Nordberg was a 1250 horsepower unit, the largest attempted by any builder in this country prior to 1915. This was followed by 2250 and 4000 horsepower engines, these also holding records for size at the time they were built. With this pioneering experience of Nordberg in the development of large Diesels in America, and the many that were installed in the years which followed, it is only natural when thinking of large units today to think of Nordberg.

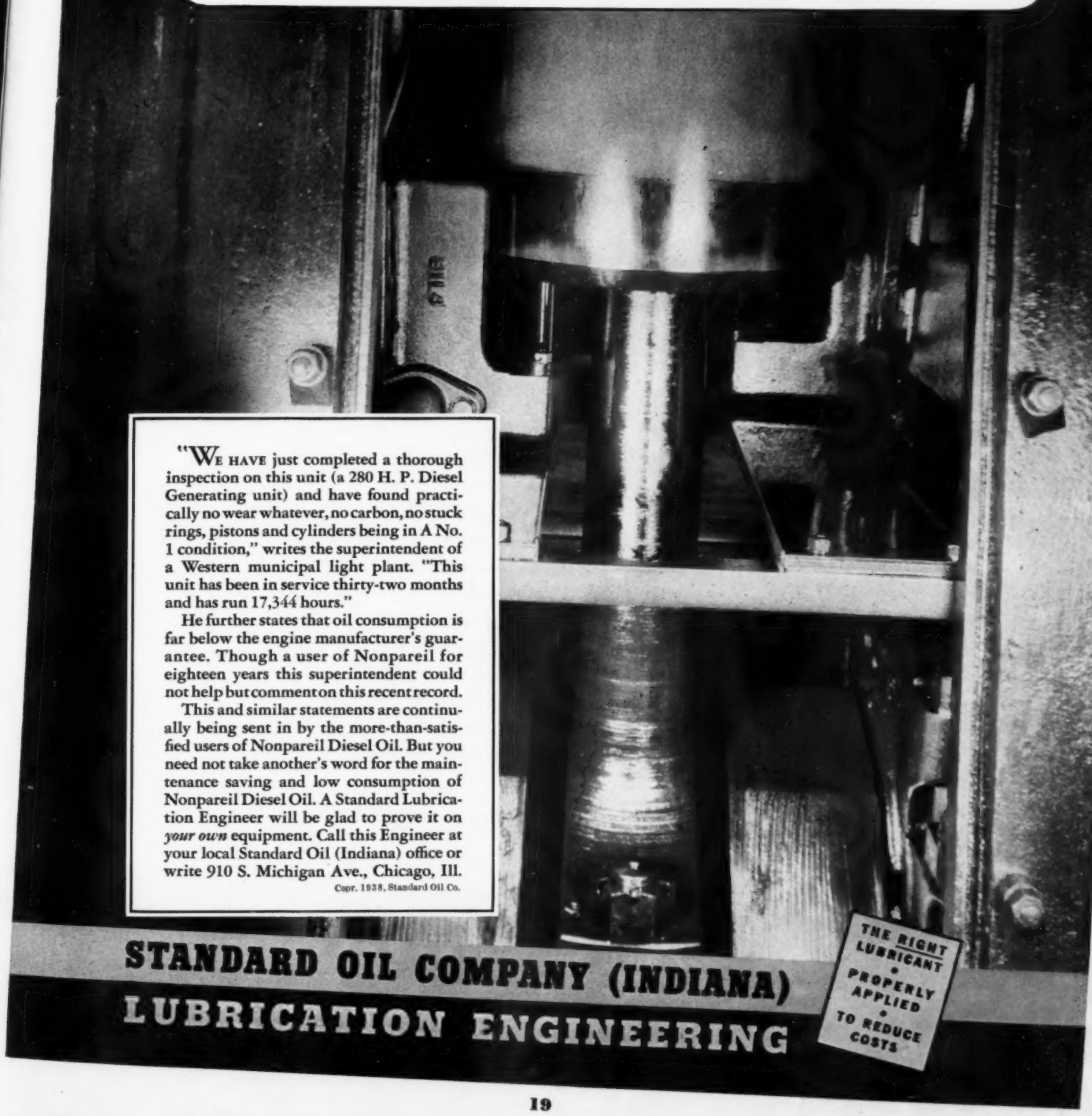
NORDBERG MFG. CO. MILWAUKEE WISCONSIN

NEW YORK · WASHINGTON · CLEVELAND · KANSAS CITY · DALLAS · LOS ANGELES

STANDARD OIL COMPANY'S

NONPAREIL DIESEL OIL

sets another 17,000 hour record



"WE HAVE just completed a thorough inspection on this unit (a 280 H. P. Diesel Generating unit) and have found practically no wear whatever, no carbon, no stuck rings, pistons and cylinders being in A No. 1 condition," writes the superintendent of a Western municipal light plant. "This unit has been in service thirty-two months and has run 17,344 hours."

He further states that oil consumption is far below the engine manufacturer's guarantee. Though a user of Nonpareil for eighteen years this superintendent could not help but comment on this recent record.

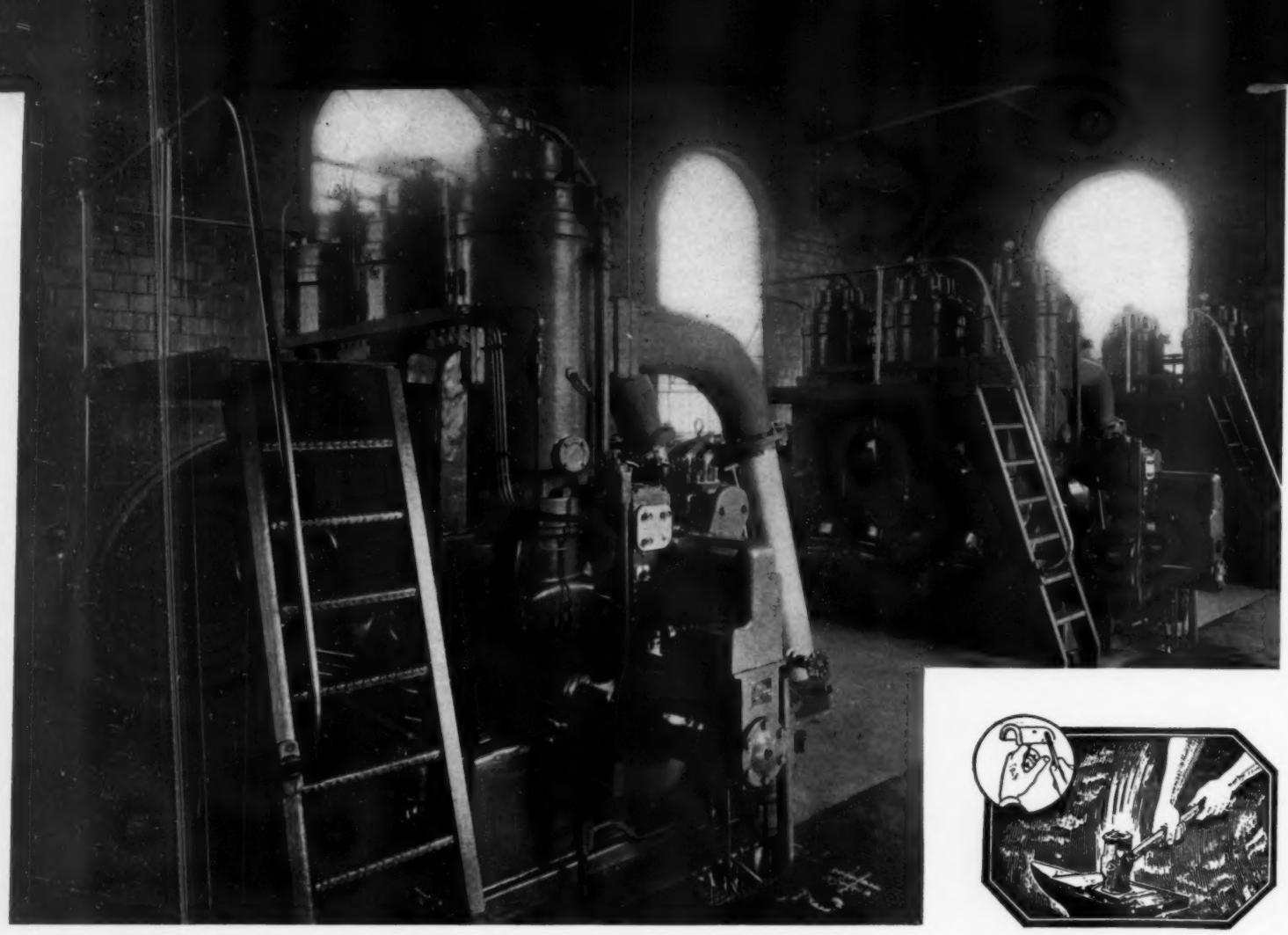
This and similar statements are continually being sent in by the more-than-satisfied users of Nonpareil Diesel Oil. But you need not take another's word for the maintenance saving and low consumption of Nonpareil Diesel Oil. A Standard Lubrication Engineer will be glad to prove it on *your own* equipment. Call this Engineer at your local Standard Oil (Indiana) office or write 910 S. Michigan Ave., Chicago, Ill.

Copr. 1938, Standard Oil Co.

STANDARD OIL COMPANY (INDIANA)

LUBRICATION ENGINEERING

THE RIGHT LUBRICANT • PROPERLY APPLIED • TO REDUCE COSTS



Constantine, Michigan, municipal power plant equipped with three Ball-Muncie Engine Company's Diesels, 165 hp., 3-cylinder, 2-cycle, operated at 327 rpm. Main bearings are Satco lined.

TRITE . . . but TRUE

"EXPERIENCE", we are told, "is the best teacher". True. And the price need not be dear. Not if full advantage is taken of the experience gained by others. When it comes to choosing the right bearing alloys for Diesel engines many builders and operators are taking the short-cut to satisfaction by specifying Satco* metal lined bearings. Why? Simply because Satco has long since proved its ability to stand the gaff in Diesels of all types on all sorts of jobs. Satco metal was developed especially to meet the needs of modern power plants. It has strength and hardness without brittleness. It has resistance to compression yet possesses sufficient plasticity to conform to the shaft in order to distribute loads evenly. It behaves well at elevated temperatures and naturally has a low frictional coefficient. In short, Satco metal has what it takes to do the kind of a job you expect of a bearing alloy.

**A patented alloy manufactured by National Lead Company. Trade-mark registered.*

AMERICAN BEARING CORPORATION

AFFILIATED WITH NATIONAL LEAD COMPANY

INDIANAPOLIS — CENTRIFUGAL — American Bearings — FORCE — INDIANA

REX. W. WADMAN
Editor and Publisher

FRONT COVER ILLUSTRATION: Mr. E. M. Clark's P. & H. 1½ yd. Dragline in operation near Lincoln, California. Mr. Clark also operates a Bodinson Dredge and a Model RD7 Diesel Tractor, all three units equipped with Caterpillar Diesels.

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B. J. VON BONGART
Technical Editor

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Fleet of Santa Fe Streamliners.

SANTA FE ADDS SIX DIESEL STREAMLINERS

By CHAS. F. A. MANN

WITH the inauguration on April 17th (between Chicago-Kansas City and Wichita, Kan.), of two identical seven-car Diesel streamlined trains, known as the *Chicagoan* and the *Kansas Cityan* — the Santa Fe railroad now boasts the largest fleet of streamlined trains in America and the second-largest fleet of Diesel trains. Coincident with the program of rapidly extending the routes over which high speed Diesel train service is to be operated by the Santa Fe, six complete 12-car streamlined all-sleeping car trains have been placed into service. This replaces the entire heavy equipment consisting of the *Chief,* famed daily fast train between Chicago and Los Angeles. The point of interest in the fleet of six large streamliners is the fact, that, while at present they are powered with steam locomotives of the latest type, it is planned to eventually haul the trains with Diesel power. Another point of interest is the fact, that the new high pressure steam locomotives developed for the *Chief,* will just about haul the 12-car trains on a 48-hour schedule, and that is all. If the run of the daily *Chief* were cut from 48 hours down to the 39-hour schedule of the two *Super Chiefs,* then Diesel power would have to be used.

Close-up of bar in cocktail lounge, Santa Fe "Super Chief."

Since March 1st, the Santa Fe has placed in operation a total of 12 new streamlined trains, six Diesel powered and six steam operated. The first three trains to go into operation were the new 3,600 hp. nine-car *Super Chief* (a second and almost identical counterpart of the original Diesel *Super Chief,* placed in service in June, 1937), and two identical five-car all-coach transcontinental trains. The *El Capitan,* fourth new train, was formerly the six-car *San Diegan.* The *El Capitan* and the *San Diegan,* as well as the twin *Chicagoan* and *Kansas Cityan* trains, are all hauled by single unit 1,800 hp. Diesel locomotives. The second *Super Chief* is drawn by two units of 1,800 hp. each.

The addition of these six Diesel trains increases the Coast-Chicago fleet of Diesel trains to four, and adds important intermediate territory on both ends of the system to the growing mileage served by daily Diesel streamliners. The idea of having the *El Capitan* trains and the *Super Chief* trains, both operating on a 39-hour schedule from Chicago to Los Angeles

Control Cab on Diesel locomotive Santa Fe "Super Chief."

Engine compartment of Santa Fe Diesel locomotives.

Sleeping accommodations of Santa Fe Diesel Streamliners.

on a basis of two round trips per week each, is the unique method developed by the Santa Fe for dividing up the coach passenger business and the sleeping car trade into separate trains operating on the same hourly running time, rather than place both classes together in one gigantic streamliner with huge Diesel locomotives.

The *El Capitan* trains of five cars carry 192 paying passengers, on a basis of $39.50 fare, for a 1,800 hp. Diesel locomotive, while the *Super Chief* trains carry about 125 sleeping car passengers at nearly $100 fare, and require 3,600 hp. Diesel locomotive to do the job. Not to be outrun by their rival, the Union Pacific, the Santa Fe has actually added about 70 passengers to the capacity of their two trains without adding a bit of Diesel power (5,400 hp. total), nor adding a single coach (14 revenue cars on Santa Fe, 13 revenue cars and 1 auxiliary car on the Union Pacific trains).

Power Plants on All Trains

The entire fleet of Santa Fe Diesel trains is powered with a fleet of almost identical Electro Motive Corp. Diesel locomotives. The flashing red, orange and silver colored exteriors of each locomotive identify them immediately as Santa Fe, but underneath their machinery they are alike as peas in a pod! The 1,800 hp. units are complete locomotives, with two 12-cylinder, 900 hp. EMC two-cycle Diesel engines; each with its blower, radiator cooling system, air compressors, main and auxiliary generators and self-contained pumps. The locomotive construction embraces the usual 600-volt electric transmission system, with geared motors to the two outer pairs of wheels on both of the six-wheel trucks. Heating is supplied by a flash type oil fired boiler. A feature of these new 1,800 hp. locomotives is the use of much larger cast steel trucks than were originally fitted, as well as a new springing system to make them ride better on curves. Fuel oil capacity is 1,200 gallons, and water for radiators and heating boilers to the extent of 1,100 gallons is carried. The battery set for starting, locomotive lighting, emergency compressors, control system and safety interlocking telegraph system, is carried under the hood at the front end.

The 3,600 hp. locomotives are identical except that a squared-end type 1,800 unit is coupled to an 1,800 driving unit, to make up the two-unit locomotive. Incidentally, these new Santa Fe locomotives are all a part of an order estimated to cost $1,800,000, placed during 1937 with the Electro Motive Corp. of La Grange, Ill.

Close-up of "El Capitan's" Diesel-locomotive, Chicago — Los Angeles Division.

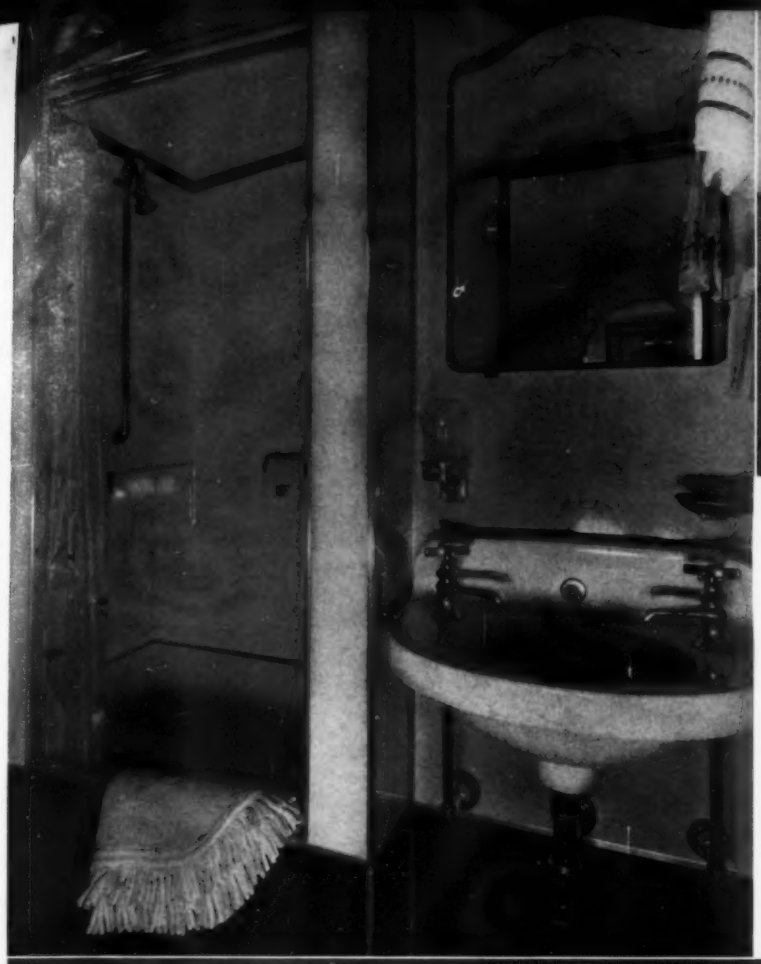
Makeup of Trains

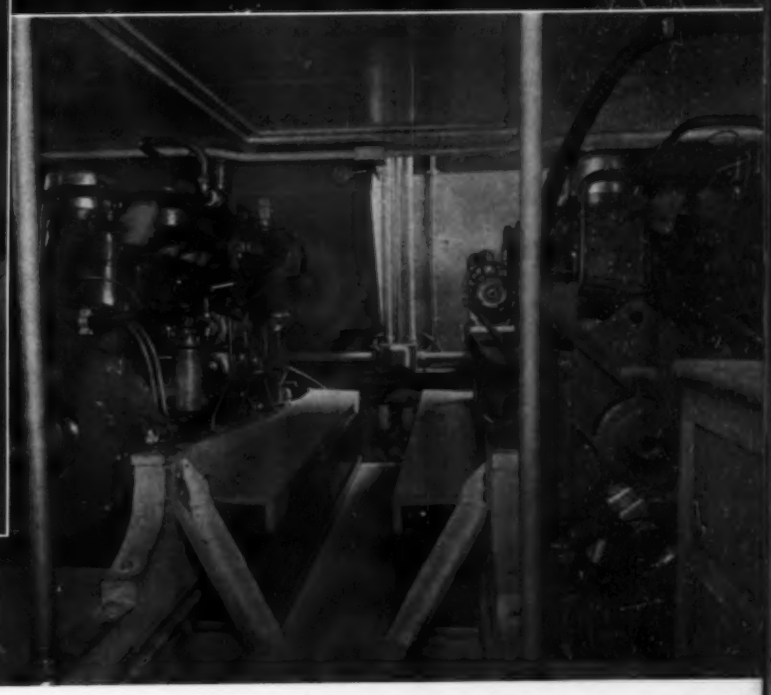
Outstanding in this fleet of trains is the fact, that every day coach, dining car, baggage car, parlor and club car is a separate and independently coupled individual railway coach, built entirely of shot-welded stainless steel of the Budd Mfg. Co. Every coach is the last word in design and construction, and is equipped with double shatter-proof glass. Four-wheel trucks with high-speed brakes; a novel steam jet air conditioning system that both heats and cools the car with steam from the heating boiler instead of from power drag off the main locomotive. Only the fan motors run off axle-generated power. Sponge rubber upholstery, luxurious carpeting, decoration scheme, curtains and blinds and soundproofing, make them the most distinctive fleet of railway coaches ever built in America. Some 45 special cars from the Budd plant were used in making up this fleet of streamlined trains. The Santa Fe does not believe in articulated cars for their streamlined trains, nor do they favor elaborate Diesel auxiliary power plants. Each car is a separate piece ready to fit into either a streamlined train or a slow-poke "Limited," behind steam or Diesel, or hay burning locomotives!

The sleeping cars on the second *Super Chief*, unlike the first *Super Chief*, were all built by Pullman and are heavy and more stodgy pieces of equipment all around. Throughout all trains a note of lavish luxury has been developed that mark the whole fleet as among the world's best.

. . . . *And now please turn to page 48*

Streamlined Observation Chair Car on Santa Fe's "El Capitan," fastest all-chair-car Train in America.





MR. L. G. FERRIS of Kenosha, Wis., is the proud owner of *Jimsea,* one of the finest new yachts on the Great Lakes. *Jimsea* was designed and built by Henry C. Grebe, Inc. Principal dimensions: — 54′ in length, 52′ 6″ on the water line, 13′ beam and 3′ 6″ draft. A pair of 110 hp. Buda Diesels, operating through reduction gears, give the yacht a maximum speed of 15 mph.

"JIMSEA"—A 54 FOOTER

A Buda Powered Diesel Yacht

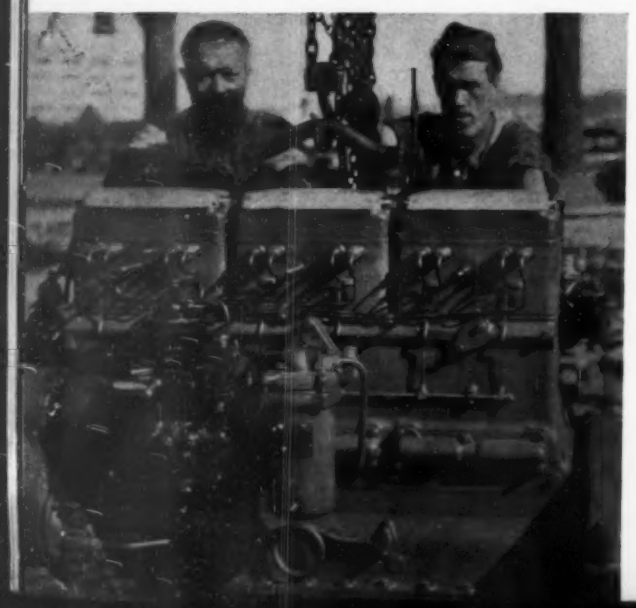
DIESELIZED FERRY SERVICE

By A. W. PONSFORD

THE evolution of the Star & Crescent Boat Co.'s utility fleet from heavy-duty gasoline—then Diesel—power in its ferry boats and light tugs; and high-powered gasoline engines in shoreboats, to a standard use of 100-hp. 6 cyl. Cummins high-speed Diesels in vessels under 60 feet in length, is an object lesson which should prove of interest to all light-fleet owners.

The diversified activity of this company, which has operated on San Diego, Calif., harbor and out of it for 30 years, calls for a variety of craft. It maintains 24-hour, 30-minute service to the Naval Air Station by the 60-ft. *Scout* and *Hyack;* has a number of water-taxis in shoreboat service, also on 24-hour basis; in addition operates a fleet of modern deep sea sport fishing vessels, *Sea Angler, Star Angler, Golden West* and *Virginia.*

It has two offshore Diesel tugs, *Palomar* and *Cuyamaca,* the Diesel tanker, *San Diegan,* and what is considered the world's finest offshore fishing barge, *Point Loma,* with auxiliaries operated by Diesels.



The "assembly line" for the change-over operation, showing one of the Cummins engines.

A couple of years ago, plagued by high cost of operating gasoline-powered shoreboat service six times daily (to the *Point Loma* from the company's dock at the foot of Broadway, to the kelp beds outside, a round-trip run of 20 miles), the Star & Crescent was induced to purchase a Cummins 100-hp. 6 cyl. 4-cycle Diesel, 4⅞ in. bore—6 in. stroke, with electric starter. Maximum rpm. 1,650, total weight 2,500 lbs.

It was frankly an experiment for *S. & C. No. 33,* a 49 ft. by 10½ in. round-bottom shoreboat. The old wheel, 26 diameter, 28 pitch, was replaced by a 28-24 propeller, and driven through 2-to-1 reduction gear. The performance of that engine was so remarkable that Cummins Diesels are now becoming standard equipment, not only for the company's utility fleet, but also as auxiliary engines in tuna clippers.

The engine had 900 hours of gruelling service on the fishing barge run, after it had worked in ship-to-shore transportation during the entire winter. It started the season May 28, 1937, ran 105 days, covering around 100 miles a day at maximum speed, turning up 1,650 rpm.

Without overhaul, the engine was placed in shoreboat service following termination of the fishing season in September, and worked on a 24-hour schedule until Feb. 18th of this year, and then finally taken down. It needed new bearing shells, one sleeve, one piston, rocker rollers replaced, and shaft reconditioned. The job took about 10 days, costing less than $300 to place the engine in first class condition, counting labor.

Capt. Oakley J. Hall, president and general manager, Star & Crescent companies, then decided he had found the right power plant. In rapid succession this year, the 40-ft. water-taxis *Sea Jay II* and *Sea Jay IV,* the ferry boat *Scout,* and sport fishing vessel, 60-ft. *Golden West,* have been repowered with the same engines. The shoreboats have 2-to-1 reduction gears; larger vessels, 3-to-1.

The company has discovered that these engines can be made interchangeable, which saves a great deal of money in time and labor. At its fitting dock, it has set up an "assembly line" and when changeover time comes, four bed bolts are loosened, chain falls swing the engine forward six inches out of gear box to release from clutch drum, and out it comes and into the shop. The change now takes only eight hours and, with hook-up complete, the vessel, is underway again.

On April 14, the latest installation in the *Golden West* (replacing a heavy-duty Diesel), was finished and, with the same wheel, the vessel was driven over the measured mile. Originally she had a top of seven knots, but her new plant drove her at exactly 10, the Diesel turning at 1,500 rpm.

As for economy of fuel, tests on the *Scout's,* twice-repeated 2-mile run each hour across the harbor, showed the Cummins using 3 7/10th gals. per hour. The *Golden West* consumers in a daily run to the Coronado Islands, 50 miles round trip, slightly more than 4 gals. per hour.

KANSAS CITY SOCONY

By GEORGE D. CROSSLEY

THE Socony-Vacuum Oil Company has placed into service a complete transportation unit consisting of a modern Diesel-engined river towboat and four oil barges of 8,000 gallons capacity. The towboat has been named *Kansas City Socony* to indicate that it is to serve the communities between Kansas City, Mo., St. Paul, Minn., and Louisville, Ky., hence for service on the Missouri, Mississippi and Ohio rivers.

The towboat is powered with two six-cylinder Superior Diesels of 510 hp. each, driving four-blade propellers 68 in. in diameter and giving the boat a speed of 10 miles per hour. Electricity for lighting and for the operation of auxiliaries is furnished by two 30-kw. Superior Diesel-generator sets. The engines are equipped with four Maxim silencers, two for the main and two for the auxiliary engines.

Between the main propulsion engines are grouped the controls, consisting of the maneuvering equipment but also Alnor pyrometers and Reliance tachometers.

Both main and auxiliary engines are equipped with the closed cooling system. Raw water is circulated through four Simms heat exchangers, by two independent, electric motor-driven pumps, each of 400 gpm. capacity.

The current generated by the Superior Diesel-generator sets is distributed by a Smith-Meeker switchboard, an Edison cell storage battery set is maintained for stand-by services.

The hull of the *Kansas City Socony* is of the modified tunnel-stern design and is of all-welded steel construction, its dimensions are 125 ft. by 32 ft. by 7 ft. The construction of the hull was attended by some interesting and very unusual circumstances. The construction work was started at the Kaw Point Boat Company's yard on the Kaw River. When the hull was almost completed, the Socony-Vacuum Oil Company decided to finish the work at a new yard. The hull had to be moved five miles overland and in order to accomplish this, the hull was cut in two with acetylene torches, one section weighing 55 tons, the other 45 tons. These heavy and lengthy sections were placed on flat cars, moved to the point of destination, put on blocks and welded together again!

The four barges are also of all-welded steel construction, and one of them is equipped with a three-cylinder 7 x 9 Superior Diesel developing 65 hp., the latter being connected to a Waterous cargo pump of 750 bbl. per hour capacity. While barges are usually loaded or unloaded by pumping plants on shore, the Superior Diesel-driven Waterous pump on the one barge is so arranged that it can furnish pumping services for any and all of the other three barges.

The *Kansas City Socony* has been an immediate success in every respect, and the Socony-Vacuum Oil Company is proceeding with the building of similar units to extend the service inaugurated with the *Kansas City Socony*.

The towboat-tanker "Kansas City Socony" at its pier.

Western Explorer sa

The "Western Explorer", typical of the Pacific Coast type of purse seiner, is powered by a six-cylinder, 200 H.P. Atlas Imperial Diesel. Sailing with a skeleton crew of six, she will recruit a full crew at Gloucester and fish for tuna for the Gordon-Pew Company.

The "Western Explorer" is equipped with two way ship to shore radio, making the ship at sea and its crew as communicable as any telephone subscriber ashore. The photo below shows James Peterson, radio man, talking to a shore station and Martin Petrich, Jr., writing the message.

This is Herwey Petrich at the wheel of the Photo-Electric Explorer" unerringly on its course. Herwey Petrich is skipper and fishing thoroughly, and has the happy faculty of being a he knows.

AMID the cheers of 30,000 spectators and the shrieking whistles of Puget Sound craft the Atlas Diesel powered purse seiner "Western Explorer", built by the Western Boat Building Co., sailed from its home port of Tacoma for Gloucester.

Since seeing is believing, and demonstration is much more convincing than mere conversation, Martin Petrich, pioneer Pacific boat builder is sending this modern example of Pacific Coast fishing boat to Gloucester to demonstrate the technique, construction and gear he has helped to develop.

Although fishing methods may differ, the power requirements of fishing craft on both coasts are exactly the same. Dependability and economy have the same sig-

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ATLAS IMPERIAL DIESEL ENG
MATTOON, ILLINO

ATLAS DIESEL ENGINE CORP.
Fort Wharf
GLOUCESTER, MASS.

ARTHUR DUVIC'S SONS
122 Chartres Street
NEW ORLEANS, LA.

WM. A. FURTWANGLER
4 Broad Street
CHARLESTON, S. C.

FOSSAL
TARP
F

ATLAS IMP

...sails for Gloucester!

...the Photo-Electric Pilot, which keeps the "Western ...ey Petrich is skipper of the boat, knows boat building ...y faculty of being able and willing to tell you what he knows.

There is the galley, showing mess table for twelve hungry men, tile sink with hot and cold running water, oil burning stove with electric refrigerator alongside.

This is a partial view of crew's quarters showing air filled mattresses, individual port holes, clothes locker and drawer for each man. The "Western Explorer" has total accommodations for twelve men.

Andrew Vranic, Chief Engineer, has owned and operated three Atlas Diesels in the past ten years. Thoroughly competent and experienced, the machinery of the "Western Explorer" could not be placed in better hands. "I've always preferred Atlas Diesels", says Vranic, "because you do not have to be a contortionist to get at the moving parts for inspection or adjustment. I've always given my Atlas Diesels reasonable attention with the result that nothing goes wrong."

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nificance on either coast. Service facilities mean everything to a boat in trouble. Whether you are fishing in the Pacific, the Atlantic or the Gulf, you will find hundreds of boat owners who will tell you that they prefer to operate an Atlas because of its dependability and low cost of operation, not to mention Atlas service facilities in every large port.

Ten of the eleven purse seiners built by the Western Boat Building Co. last year were powered by Atlas Diesels, and the selection of an Atlas for Mr. Petrich's own prize boat reflects the appraisal of a boat builder who has installed many makes of engines and has watched the operation of all. We urge you to inspect the "Western Explorer" at Gloucester, or when it calls at your home port.

...IESEL ENGINE COMPANY
...ON, ILLINOIS

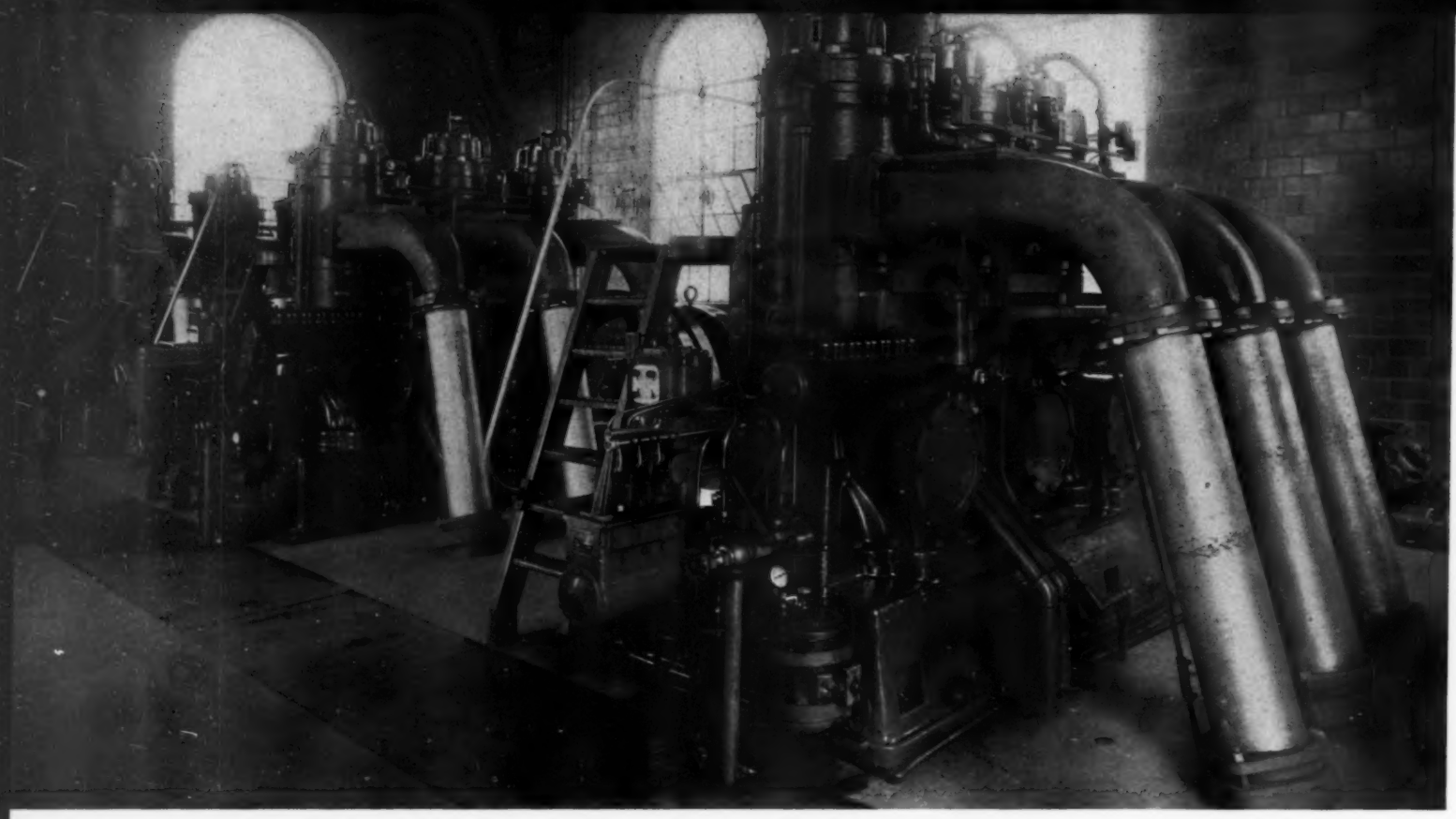
ATLAS DIESEL ENGINE CORP.
115 Broad Street
NEW YORK, N. Y.

...R

FOSSAL & SACLARIDES
TARPON SPRINGS
FLORIDA

J. T. PHIPPS
Riverside Viaduct
JACKSONVILLE, FLORIDA

...MPERIAL



The Three Ball-Muncie Diesel Engines at Constantine, Mich.

CONSTANTINE, MICH.

By F. F. VAN TUYL, *Consulting Engineer*

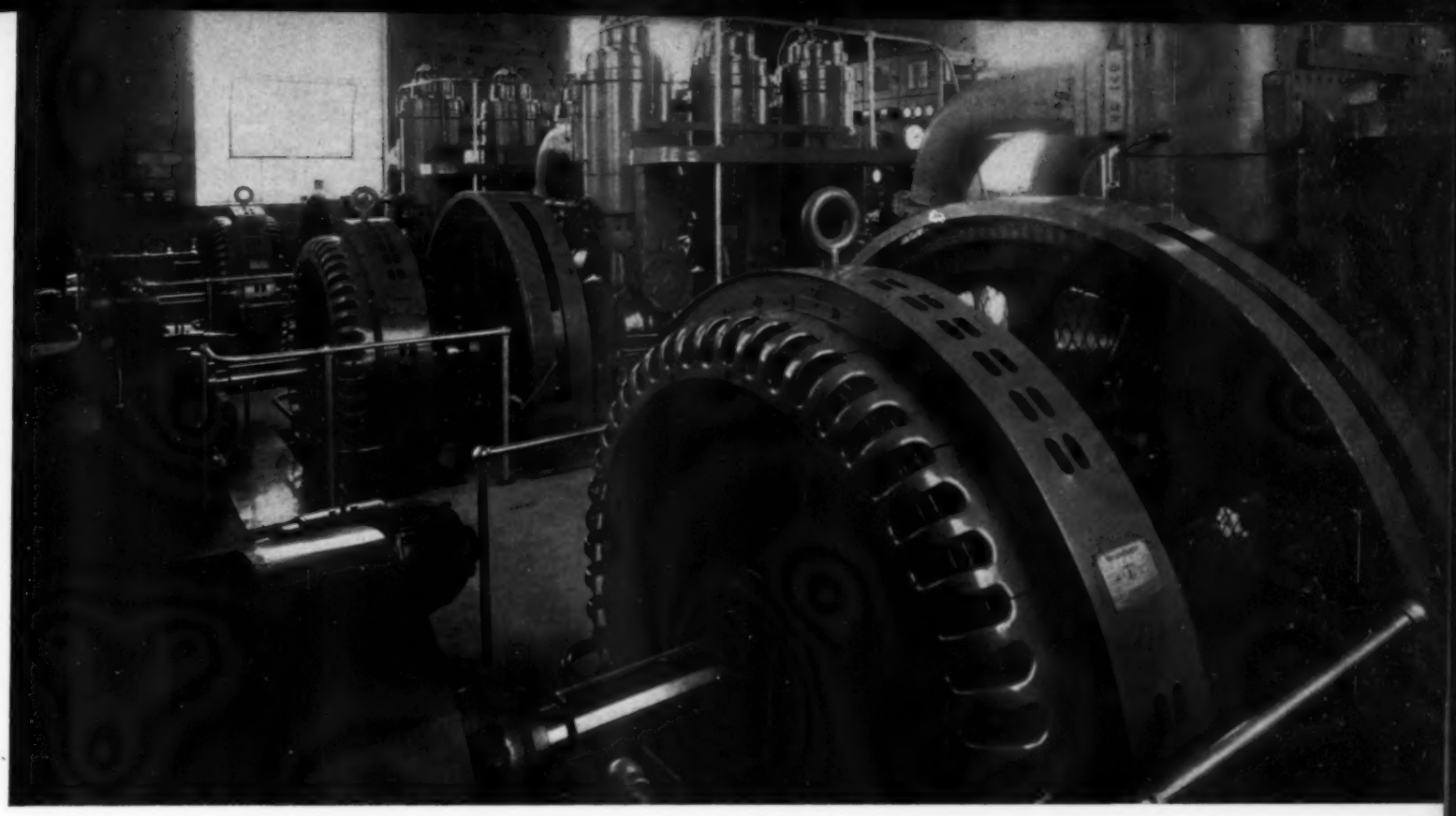
THE village of Constantine, with a population of 1,250 people, is located in the southwestern corner of the State of Michigan, close to the northern Indiana state boundary. It is a small rural community having no large manufacturing or other industrial enterprises which would require large amounts of electric power.

Reading the records of the village, one discovers that several attempts were made to supply electricity for street and domestic lighting. The earlier private plants were operated by water power, but at least one of these plants was provided with some sort of an internal combustion engine as auxiliary equipment.

As has been the case in many small villages, the early plants, or the survivors of them, were, graciously or otherwise, absorbed by the Michigan Gas and Electric Company, a huge public utility supplying many communities in southwestern Michigan. The franchise of this company expired by limitation in 1932, and since that time the question of a municipal lighting plant in the village has been given consideration. In April 1936, the common council requested that a study of the needs of the village be made as to the practicability of establishing a municipal lighting plant.

The report indicated that a plant could be built and operated at a sufficient profit to warrant the sale of about $107,000 of revenue bonds. The common council called for a referendum. The vote being in the affirmative, the common council proceeded to have plans and specifications drawn and proposals were received upon the said plans. As the prices submitted for the work came within the estimated cost, the common council called for another election asking authority to issue the above mentioned bonds, which were secured by hypothecating the proposed plant and also by pledging the receipt accruing by virtue of plant operation. It was also proposed, that the bonds to be issued should never become a taxpayers obligation. To this, the people of Constantine gave an 80 per cent favorable majority, thus authorizing the bond issue.

Contracts for the construction work were awarded to Mr. Bruce Hoffman of Constantine, Michigan, covering the building proper and the engine foundations, to the Ball Muncie Engine Company for three 165 hp. three cylinder vertical two-cycle Diesel engines, 13″ bore and 16″ stroke operating at 327 rpm., equipped with American Bearing Company's Satco metal lined bearings and Ellwood City Forge Company's crankshafts. The engines are fitted with Maxim silencers, Air Maze air filters and Honan-Crane lube oil purifiers. A Quincy compressor supplies air for starting purposes. The controls of the engines include Pickering Isochronous governors, Alnor pyrometers, Weston temperature gauges and Sims heat exchangers. The engines are directly connected to three Westinghouse 110 kw. generators operating at 80 per cent power factor. The voltage regulators are of the Ward-Leonard electronic type and the

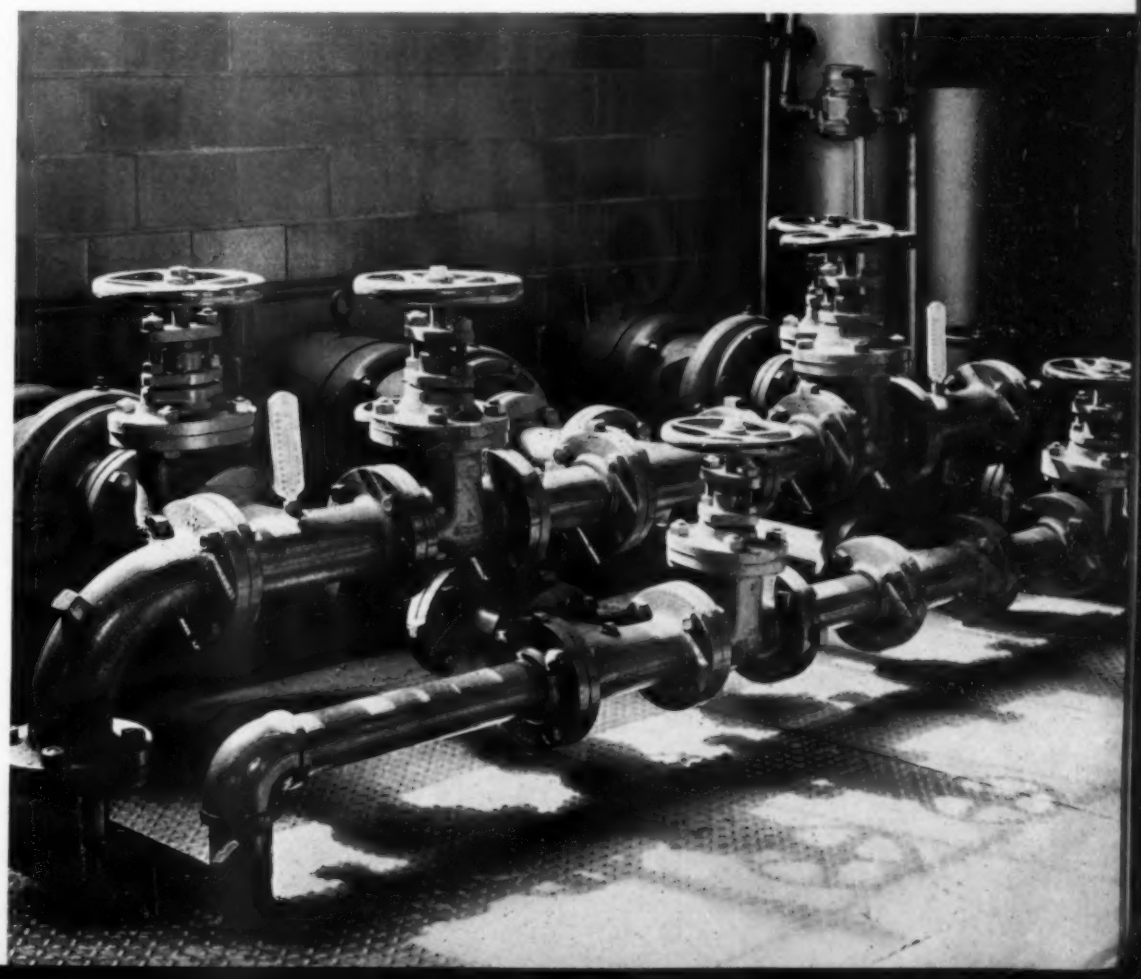


Generating Electricity with Westinghouse Diesel-driven Generators.

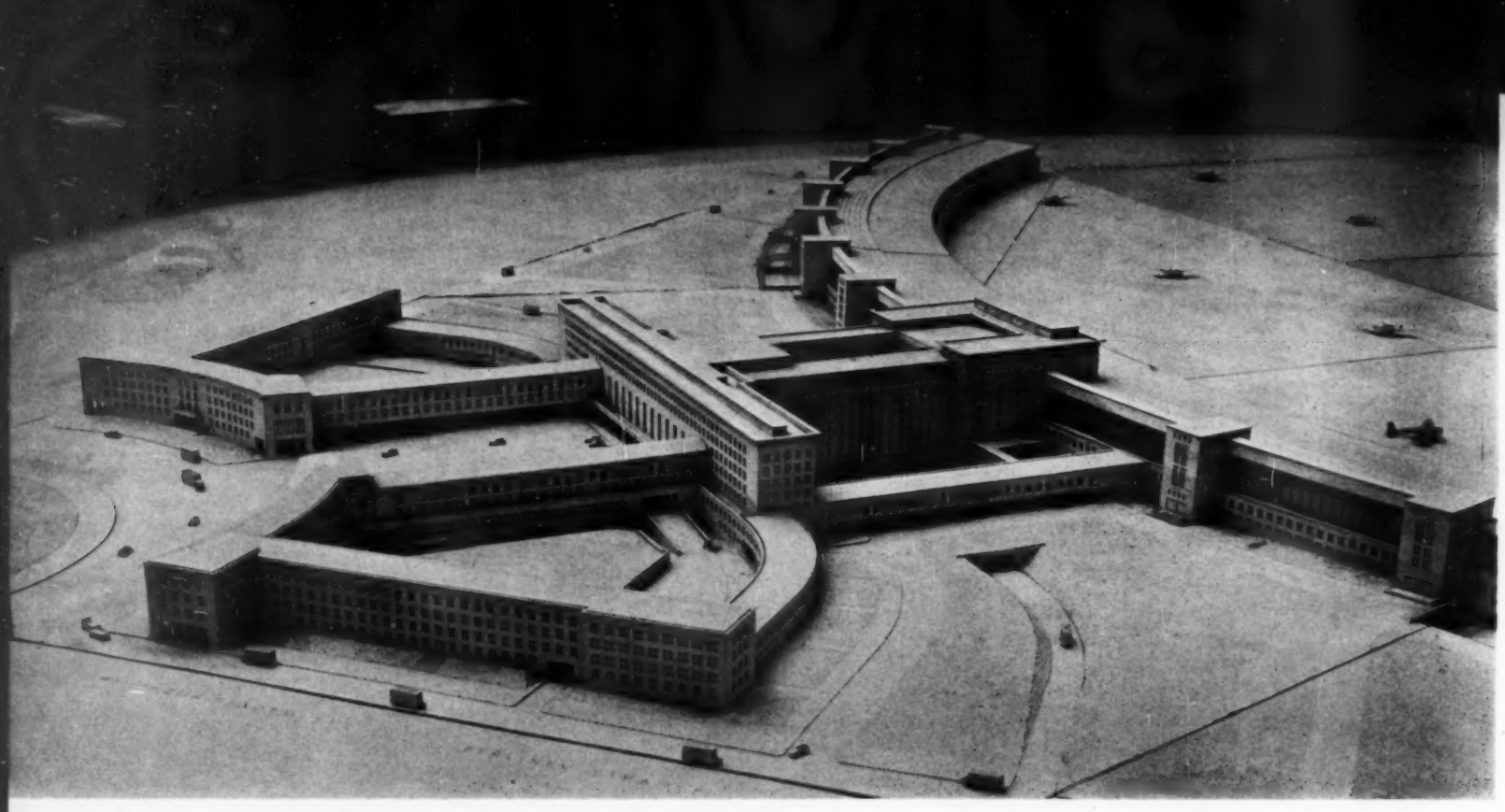
frequency is controlled by a Warren Telechron clock. The switchboard is of Westinghouse make and complete with volt and ammeters. And Esterline-Angus watthour meter is used.

The Michigan Gas and Electric Company was asked to put a price upon the poles and wires they had in use in the village, but they declined to do so, preferring not to sell. Hence an entirely new distribution system had to be installed. Where possible, the village's new distribution system was installed on the opposite side of the streets or alleys from the lines of the Michigan Gas and Eectric Company, so as not to interfere with the latter's distribution lines. In some cases it was necessary to use higher poles in order to carry the municipal's lines above those of the public ultility, but the whole system was installed without any interference with the existing public utility distributing system, thanks to the extreme care used.

The street lighting system consists of 110 volt bulbs operated from the regular transformers installed throughout the village for domestic lighting purposes. Each group of street-lights supplied from any transformer is controlled by a 60 ampere 110 volt relay, and these relays are controlled by two automatic self-winding clocks located near the center of the distributing system. This makes a very inexpensive, flexible and satisfactory system of street lighting for a small community. In general, 300 watt bulbs are used in the residential section of the village and 500 watt bulbs in the business district. Everything installed has been of the best quality of its respective kind, and has been so arranged that plant maintenance should be reduced to the very minimum. Mr. Victor E. Williams is superintendent of the plant and the author was the consulting engineer and superintended the construction work in its entirety.



Water Pumps and Water Softener Installation.



Model of the New Headquarters for Diesel Aviation at Berlin.

NEW HEADQUARTERS FOR DIESEL AVIATION

By PAUL H. WILKINSON

WORK is proceeding rapidly on a magnificent new airport at Tempelhof, two miles from the center of Berlin. Here, when it is completed, will be the headquarters of the Deutsche Lufthansa and the center of Diesel aviation. Already, most of the steelwork is in place and the buildings are fast taking shape. Commenced in 1937, the largest airport in the World will be opened for air traffic early in 1939.

Since 1923, Tempelhof has been used as a flying field, ranking high in the size and appointments of its buildings. So rapidly has air traffic increased, however, that soon these will be inadequate and out-of-date. The new airport was designed by Dr. Ernst Sagebiel and is in the form of an immense oval a mile and a half long and a mile wide, with a concrete apron around its edge. At the northwest corner, the curved buildings will give a good view of the flying field to the spectators. More than 1,200 acres will be available for runways and landing areas.

So vast will be the expanse of buildings, that it is indeed difficult to visualize what they will be like. In one group, will be the administration building surrounded by other structures comparable to the largest railway station. In another group, will be the hangars and the covered loading area along the flying field, extending for four-fifths of a mile.

At the entrance to the new Tempelhof, will be arcades lined with shops. Then comes the administration building 328 feet long, 164 feet wide and 62 feet high. Behind this, is the "main hall" towering to a height of 100 feet. Here will be the booking offices and the waiting room, while through the immense windows at the airport end, the passengers will see their planes waiting in the covered loading area beyond. Underground roadways will be provided for passengers and freight coming to the airport by automobile – the arcade entrance is for the many thousands of spectators that the new "air city" will attract and thousands of spectators will be there every day.

The buildings along the flying field constitute what is probably the longest covered structure ever built. The covered loading area for the planes, which is in the center, has a length of more than 1,200 feet. On each side, a frontage of 1,300 feet is devoted to the hangars. From

one end to the other, the roof is continuous and is suported on cantilever beams reaching out 120 feet. Here, the largest planes can be sheltered from the elements, while as many as twelve large airliners can be accommodated in the loading area at the same time. Even today, loading planes under cover is unique in aerial transportation!

In the loading area, planes will be hauled by Diesel-engined tractors, which will be more economical than running up their engines. At the same time, this will eliminate noise and fumes. Along the rear of the hangars and the loading area, will be railway tracks so that the transportation of freight and supplies will present no problem. Freight and passengers' baggage will be handled by electric trucks, while electrically-driven conveyors will load it on the planes.

Every inducement will be offered to the public, as well as to air travelers, to visit the new airport and enjoy the sights. Two subway stations will be located in the buildings, providing easy access from Berlin. On the roofs of the hangars and the loading area, will be rows of seats for 60,000 people, while as many as 100,000 spectators will be accommodated for aerial events. The main restaurant will seat 2,000 people and there will be other cafes as well, to cater to their needs.

The cost of the new German airport will probably be twice as much as the $23,000,000 which is to be expended on our new airport at North Beach, on the outskirts of New York. North Beach will have no subway connections close at hand, however, and it is doubtful whether adequate seating accommodations will be provided for its guests. Furthermore, it will have no up-to-date covered loading areas for arriving and departing planes, so the latter will have to stand out in the open exposed to the elements, as they have done in the past. Undoubtedly, North Beach will be a fine airport, representative of air progress in the United States—what a pity that it should lack these modern improvements, the incorporation of which would mean so much.

At Tempelhof, part of the buildings will be occupied by the headquarters of German Civil Aviation, while the airlines of other countries will also have adequate space. Here, Deutsche Lufthansa, the national airline of Germany, will have its new headquarters and from these magnificent surroundings, will despatch its Diesel-engined planes in ever-increasing numbers. After all, it is only appropriate that the newest type of aircraft should operate from the finest airport in the world!

Close-up of a Ju 86 ten-passenger Airliner showing the low frontal area of its 600 hp. Junkers "Jumo" 205 Diesels.

David and Goliath! A 60 hp. Famo Diesel Tractor handles a 23-ton Junkers Ju 90 forty-passenger Airliner at the Airport.

Two of Deutsche Lufthansa's Fleet of Diesel-engined Junkers. Ju 86 Airliners at Tempelhof Airport near Berlin. It is customary to refer to planes by name rather than by number.

THE "NEPTUNE"

Largest Single Screw Diesel Tug on the Pacific

By CHAS. F. A. MANN

COMPLETION of the extensive rebuilding and conversion from steam to Diesel power of the former Quarantine tug *R. M. Woodward* into the most powerful single-screw Diesel tug on the Pacific, the *Neptune,* has been accomplished. This was done at the Seattle plant of the Todd Drydock & Shipbuilding Co. and the fitting-out docks of her owners, the noted Pacific Coast towboat firm, the Puget Sound Tug & Barge Co.

The *Neptune* is an all-steel tug of unusually heavy construction, having overall dimensions of 115 x 24 x 12 feet and a tonnage of 115. She is all-steel up to the pilot house level, the only wood being the main deck surfacing and the upper decking and pilot house. Her extensive steam machinery was removed, after the tug was brought up from San Francisco, where she had served for many years, after being brought around from Baltimore, where she was originally built and operated as the *Neptune.* The usable electric and steam auxiliary machinery was entirely rebuilt, leaving a few of her husky original General Electric motors and a few pumps as the sole salvaged machinery in the converted vessel.

Most noteworthy is her compact and powerful Diesel propulsion plant, the new model 1,050 hp. 6 cylinder Fairbanks Morse two-cycle trunk piston Diesel engine, which develops top power at a speed of 300 rpm. An entirely new steel engine foundation was laid down in the middle of the hull and three very large fuel tanks were fitted, one forward, one midships, and one aft, giving a fuel capacity of 40,000 gallons. A 3,000 gallon fresh water tank is carried under the fo'c'sle quarters and 800 gallons of lube oil is stored in the engine room side tanks. The *Neptune* is the largest of the Puget Sound Tug & Barge Co.'s fleet of 25 Diesel tugs – this fleet being one of the largest in combined Diesel horsepower in the USA. The company also operates 50 barges.

The F-M main engine has cylinders 16 x 20 inches in size and is pump scavenged by a single-cylinder, double-acting, multiple valve scavenging pump of 37½ inches bore, and a stroke of 17¾ inches. A flattened receiver-type air manifold with safety relief cover, spring loaded is at the outer end. The air intake is ingeniously arranged. The entrance to the pump cylinder is from a baffled chamber fixed over the top of the Diesel fuel tank, from which two small leads go directly to the upper deck funnels, giving a quiet engine room and relatively no noise atop the vessel when under full power.

The pistons are oil-cooled through drilled passages in the main crankshaft and connecting rods, with oil return through trombone tubing. The total weight of the entire engine and the battery of lever operated, self-contained water, fuel, lube and service pumps mounted beside the forward end of the engine, is but 62 tons. Twin Nugent oil filters are fitted, as well as an electrically heated, thermostatically and hydrostatically controlled automatic Goulds Hydroil purifier unit. The latter mounted with the auxiliary machinery on the port side. A Kingsbury thrust bearing is fitted.

The ingenious self-contained pump layout characteristic of the F-M Diesels, permits operation and starting from cold with the use of but a single auxiliary pump, the salt water circulating pump to cool the heat exchangers and the storage set. A 56 cell Exide Ironclad 110 volt

battery set in 3 trays, is supplied to run all pumps until the main engine generator is started. In the engine room is a Gardner-Denver Auxiliary air compressor; a 2-cylinder water-cooled air compressor of 80 C.F.M. capacity; a Fairbanks-Morse fresh water circulating system; a Rex bilge pump; a 25 kw. General Electric belt-driven generator off the main engine; a Gardner-Denver salt water circulating pump driven by a 7½ hp. G. E. motor; a De Laval 400 gpm. fresh water engine cooling circulating pump to circulate water between the main engine and the Schutte & Koerting heat exchanger, driven by a 20 hp. G. E. motor; a Blackmer Rotary Pump Co. high pressure lube oil circulating pump for main engine lubrication and piston cooling and circulating between heat exchanger and the engine. A second Schutte & Koerting heat exchanger is used for the lube oil circuit.

The main engine side-lever drive operates a fresh water circulating pump, a bilge pump, a lube oil pump, and scavenging ring waste removal pump, so that the main engine will operate without use of auxiliaries except the salt water circulating pump, when once underway. The 25 kw. auxiliary generator automatically cuts-in when the main engine is rotating in forward speed, and charges the batteries and operates the regular power circuits.

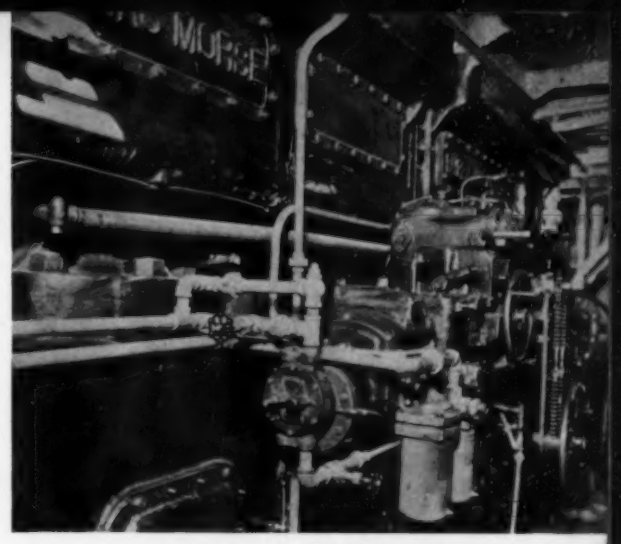
We noted the extensive use of Powell valves in all sizes throughout the engine room, over 50 of them, as well as an Alnor pyrometer for exhaust gas temperature checking. The main switchboard is of the Square D make, and all motors which were not brand new, but had been taken from other tugs, were of General Electric make.

The main auxiliary generating set is a 6 cylinder 65 hp. Continental gas engine with self-contained radiator and lube oil storage, driving a 35 kw. G. E. generator for auxiliary battery charging and pump operation. There are two air storage tanks, one small and the other 6 x 10 ft., with a capacity up to 400 lbs. per sq. in., taking its regular supply off the main engine compressor. The propeller is a 3-bladed bronze type, designed by Fairbanks Morse and built by the Coolidge Propeller Company. It is of the true-pitch type, 86 inches in diameter and has a 60 inch pitch; giving high efficiency at the relatively high towing speeds of 300 rpm.

The steering gear is a converted steam type operated by compressed air, as is the American Ship Windlass Co.'s converted steam towing windlass mounted on the after deck. This is a very large winch, able to operate smoothly with the heaviest of tows without the use of a brake. A motor driven windlass is fitted with a 50 hp. G. E. enclosed motor driving through a 9.7 to 1 Western worm gear reduction. This is also on the rear deck. A 15 kw. Markey anchor windlass is fitted on the forward deck.

The ship is heated by a Crane oil burning system, which also supplies heat for operating a steam barge pump and also heats the oil barges. Both this boiler and the galley range are fitted with De Luxe oil burners. A large Frigidaire is fitted in the galley.

A powerful two-way radio set is fitted in the pilot house, which was supplied by the North-



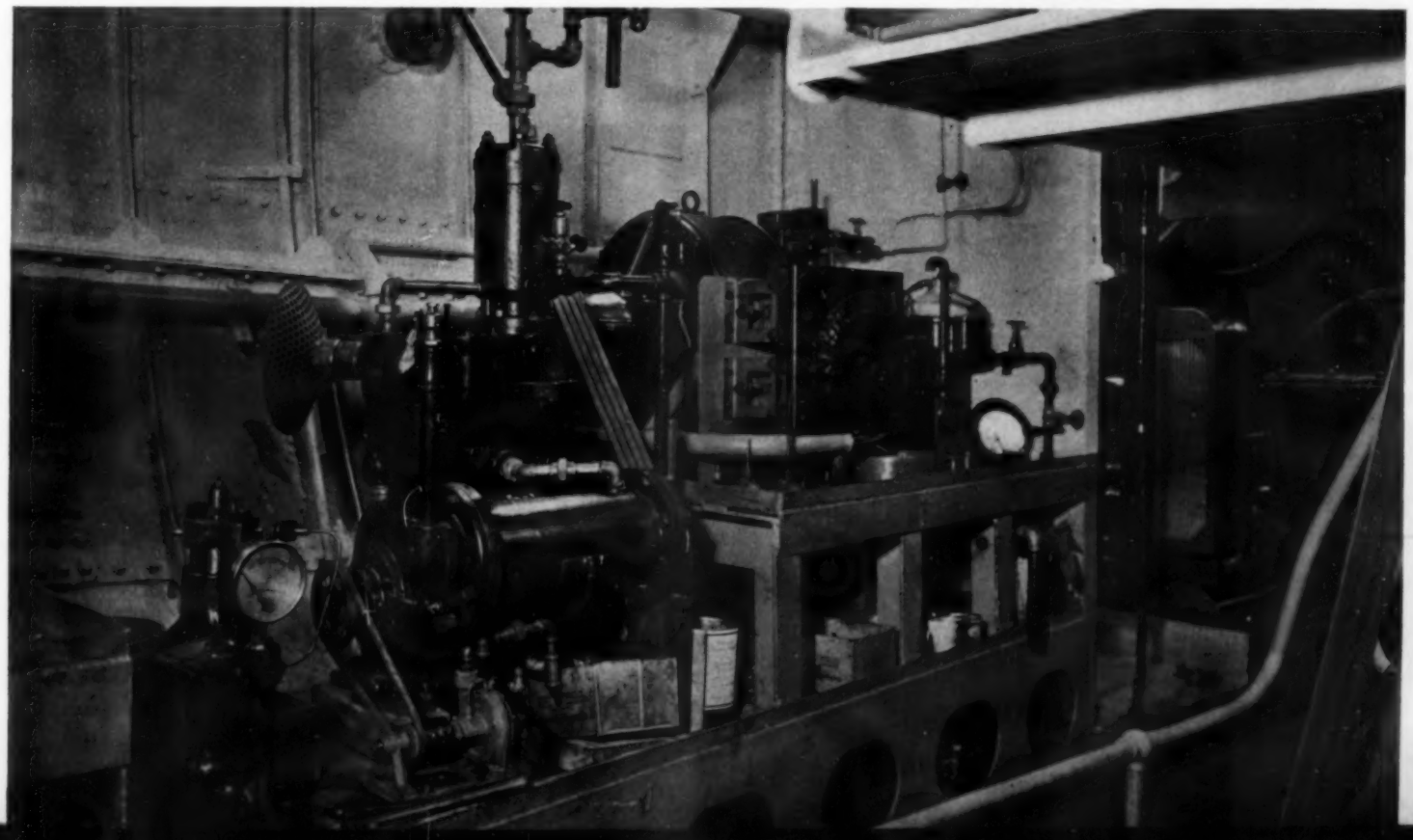
Fairbanks Morse 1,050 hp. Diesel. Nugent Oil Filters in the Foreground.

ern Electric Company, and has a range of 3,000 miles.

This tug will be used on very long-range deep sea towing work; it can operate 40 days at sea under full load. There are three large staterooms on the main deck, a large galley, a loafing room, storage lockers, a carpenter shop, etc. Below, in the fo'c'sle, are bunks for 8 men and there is a spacious captain's room on the pilot house deck. A pair of lifeboats will be carried atop the upper deck. Dual steering, both hand and mechanical, is provided for.

The Puget Sound Tug and Barge Company is a large operating company, having been slowly built up from four original operating companies dating back to the early days of navigation on Puget Sound. Officers of the Company are: George Johnson, president; George Cary, vice president; Harrison Hart, secretary; A. L. McNealy, treasurer; Capt. Lindley Davis, general manager, and Otto Friener, port engineer.

Port side of "Neptune" engine room. Rix 2-stage air compressor with Westinghouse motor and Goulds Hydroil Purifier (left to right).



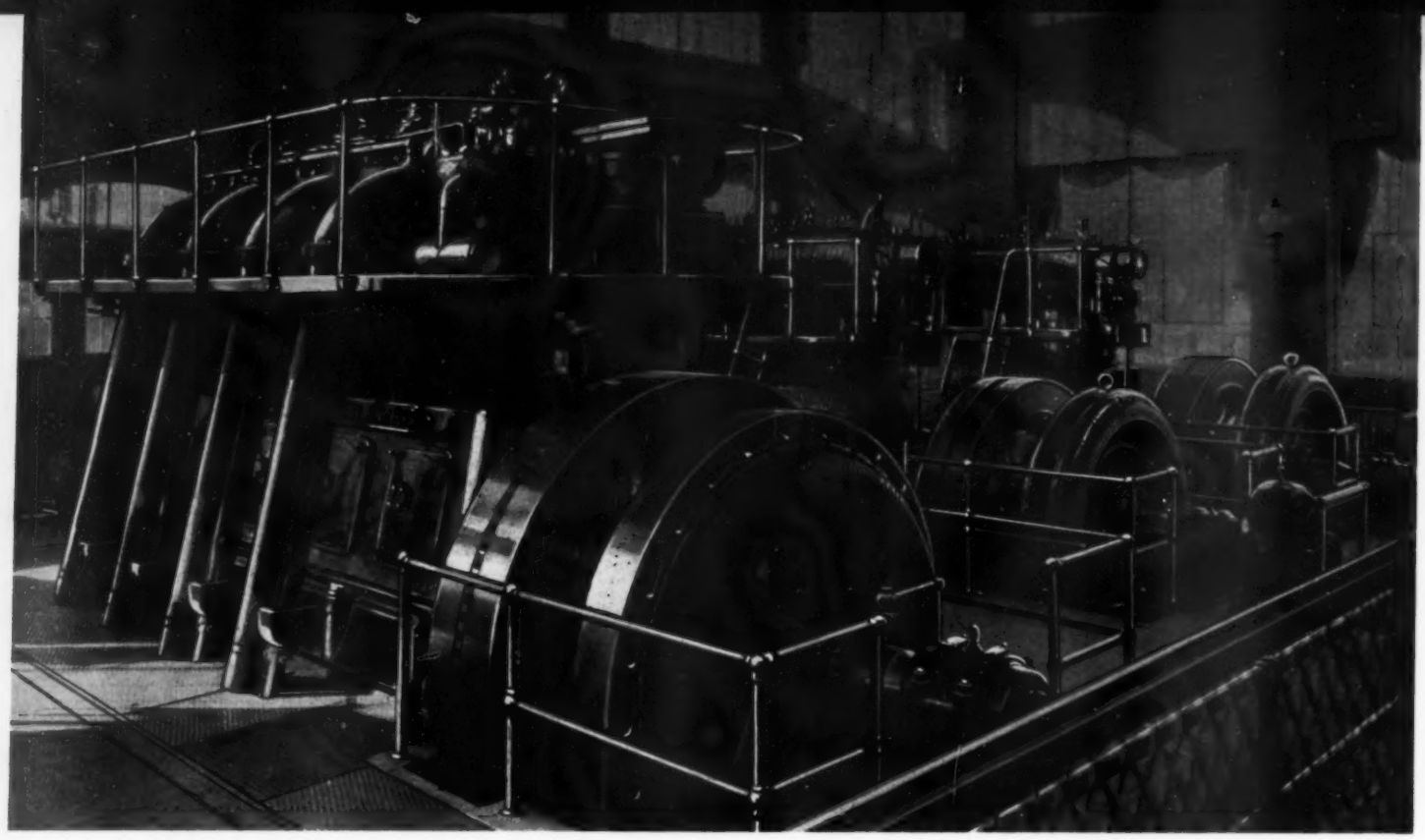


Fig. 1. Interior of plant, 1920.

MADISON, SOUTH DAKOTA

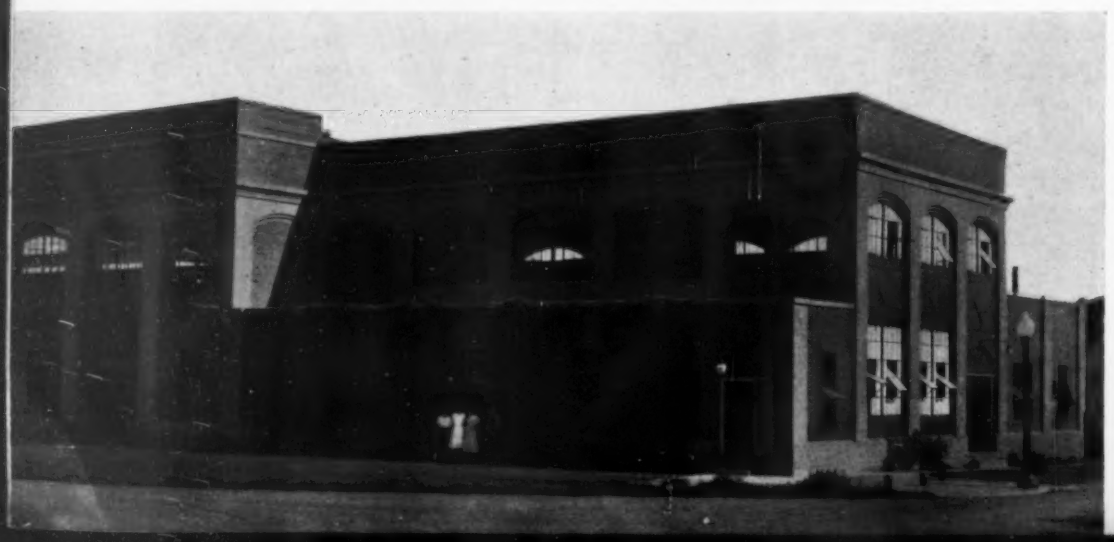
By B. J. VON BONGART

THE city of Madison, S. D. (4,500 inhabitants), is the seat of Lake County and situated 58 miles northwest of Sioux City. To some, this town may be merely a dot on the map, but let it be said that Madison is one of the most progressive towns in the U.S.A. irrespective of size. It is a municipality that has consistently refused to be a mere feeder to some utility octopus.

As early as 1898, Madison operated it own electric light and power plant. At first, electricity was generated with steam power, none other being available during the late Nineteenth Century. And, as one would surmise, the revenue from the electric service furnished seldom equalled the operating cost. In 1909, producer gas engines were installed, with the result that the plant now operated at a profit.

In 1915, Madison selected a 365 bhp. Busch-Sulzer Diesel engine directly connected to a 240 kw. 2-phase generator to augment the generating capacity. The cost of the installation was about $35,000.00, and was paid for out of earnings accumulated during the six years' operation with producer gas engines.

Fig. 2. Municipal power house, Madison, S. D.



For three years, from 1915 to 1918, the Diesel and the producer gas engines were operated togeter or alternately, depending upon service demands; when a fire destroyed the somewhat antiquated wooden plant structure. The producer gas engines were ruined completely, but the Busch-Sulzer Diesel was salvaged, since a mere camshaft, some rocker arm rollers, and the starting and injection air tanks was all that needed to be replaced in order to bring the engine again into operating condition.

Electric service had to be maintained at Madison, and the service had to be modernized. Hence, the generator was rewound and the whole system was changed over to 3-phase current generation. A belted exciter was fitted up and a temporary switchboard erected. A light frame building, to serve as temporary quarters, was erected over the plant. The 365 hp. Busch-Sulzer Diesel was pressed into service and carried the entire town's load for about a year, running continuously except for a four-hour shut-down each Sunday. The load reached peaks as high as 450 bhp., equivalent to a 25 per cent overload. Such a demand is hard on

12 YEAR OPERATING RECORD

ITEM	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Installed K.W. Capacity	576	986	986	986	986	986	986	986	986	986	1,686	1,686
K.W.H. Generated	1,845,410	1,955,080	2,069,510	2,221,350	2,440,590	2,623,740	2,689,380	2,747,030	3,013,420	3,208,920	3,536,690	3,603,500
Engine Hours Run	15,684	11,813	13,206	14,315	16,196	17,127	16,811	17,760	19,475	20,466	15,402	16,333
Fuel Oil, Gallons	159,511	173,628	180,897	195,955	211,354	223,056	228,960	234,089	259,664	275,455	296,133	305,636
Lubricating Oil, Gallons	2,040	2,286	1,703	1,704	1,906	2,354	2,177	3,147	3,046	2,166	1,954	2,082
K.W.H. per Gallon Fuel	11.57	11.26	11.44	11.13	11.55	11.76	11.75	11.74	11.61	11.65	11.91	11.79
K.W.H. per Gallon Lubricant	921	855	1,216	1,304	1,280	1,115	1,236	873	989	1,481	1,805	1,731
Peak Load for the Year, K.W.	550	580	690	710	780	780	840	820	900	945	1,000	1,060
Annual Plant Load Factor	38.3%	38.5%	34.3%	35.7%	35.7%	38.5%	36.5%	38.2%	38.2%	38.7%	40.15%	35.73%
K.W.H. Gen. per K.W. Ins.	3,206	1,982	2,100	2,260	2,475	2,680	2,727	2,786	3,056	3,254	2,092	2,137

OPERATING COSTS

PLANT												
Fuel	$11,165.79	$10,264.87	$ 9,059.30	$ 9,405.82	$10,144.99	$ 9,256.82	$ 9,547.63	$10,065.83	$12,671.60	$13,772.25	$15,398.92	$16,198.71
Lubrication	1,433.03	1,608.76	1,174.57	972.24	1,035.00	1,281.06	1,086.91	1,636.44	1,580.87	1,120.69	922.29	978.52
Supplies	2,347.03	931.98	1,543.28	1,554.06	1,182.23	801.42	817.18	447.20	379.49	580.15	671.55	523.11
Salaries	8,582.25	10,833.58	11,322.12	11,626.16	11,772.78	11,879.90	11,618.52	11,258.00	10,373.80	13,152.87	12,943.20	13,583.40
Plant Maintenance	2,650.00	2,078.17	1,737.63	2,620.87	2,209.76	2,830.37	3,160.61	2,092.77	1,196.47	1,745.33	1,685.64	2,583.13
Insurance	510.08	445.62	396.18	396.56	432.05	875.78	540.75	414.63	433.78	637.32	812.51	518.72
Total, Plant	$26,688.18	$26,162.98	$25,233.08	$26,575.71	$26,776.81	$26,925.35	$26,771.60	$25,914.87	$26,636.01	$31,008.61	$32,398.92	$53,403.92
DISTRIBUTION												
Salaries	$4,954.75	$ 4,584.10	$ 5,228.05	$ 5,261.52	$ 5,582.81	$ 4,633.34	$ 4,764.36	$ 5,270.89	$ 4,812.79	$ 6,842.47	$ 6,998.80	$ 7,485.82
Miscellaneous	616.34	1,571.50	1,468.61	1,126.18	565.84	357.63	953.77	1,118.07	1,891.48	4,891.60	2,866.31	2,807.01
Material	6,368.85	4,574.19	5,484.72	6,246.00	4,532.09	5,653.53	4,623.75	5,525.12	6,142.24	7,559.88	8,589.69	8,482.85
Insurance	250.41	218.94	182.94	179.47	223.19	224.07	189.56	194.13	201.18	164.25	333.18	241.65
Bond—Interest	4,325.00	4,000.00	3,600.00	1,800.00	600.00	600.00	None	None	None	None	None	None
Total Distribution	$16,515.35	$14,948.73	$15,964.32	$14,613.17	$11,773.93	$11,468.57	$10,531.44	$12,108.21	$13,047.69	$19,458.20	$18,787.98	$19,017.33
Total Cost	$43,203.53	$41,111.71	$41,197.40	$41,188.88	$38,550.74	$38,393.92	$37,303.04	$38,023.08	$39,683.70	$50,466.81	$51,186.90	$72,421.25
Total Operating Income (Net)	$73,314.39	$77,378.62	$78,258.30	$81,594.72	$90,168.33	$85,749.56	$78,372.27	$65,946.65	$70,745.24	$76,154.15	$77,588.22	$81,390.37
Net Operating Profit	30,110.86	$36,266.91	$37,060 90	$46,405.84	$51,617.59	$47,355.64	$41,069.23	$27,923.57	$31,061.54	$25,687.34	$26,401.32	$27,986.45
Aver. Rev. per K.W.H. Gen.	$.0397	$.0396	$.0379	$.0394	$.0369	$.0327	$.0291	$.0240	$.02347	$.02373	$.02200	$.02397
Cost of Fuel, per Gallon	$.07	$.0591	$.0508	$.048	$.048	$.0415	$.0417	$.043	$.049	$.05	$.052	$0.053

Note: The above statement of "Operating Income" includes no allowance for street lighting, power for pumping city water or for lighting city schools, public library, sewage disposal, park, and Municipal buildings, which services are furnished without charge. The total current so furnished for Municipal purposes, without charge, in 1936, amounted to 1,138,130 K.W. hours.

Note: Prior to 1933 various amounts are included in "Plant" and "Distribution" costs, which amounts should be classed as Capital Expenditures. Taxes collected on electric bills have been deducted from "Operating Income."

Fig. 5. 12-year operating record.

any engine, especially on one which has been through a fire. Yet, during this period but little trouble was experienced and the service was completely satisfactory.

A new fireproof building was erected in 1920 and two 250 bhp. Busch-Sulzer Diesels directly connected to 3-phase generators were purchased and placed in operation. The plant, as it existed then (1920) consisting of the 365 bhp. engine purchased in 1915 and the two new 250 bhp. engines, is shown in Fig. 1.

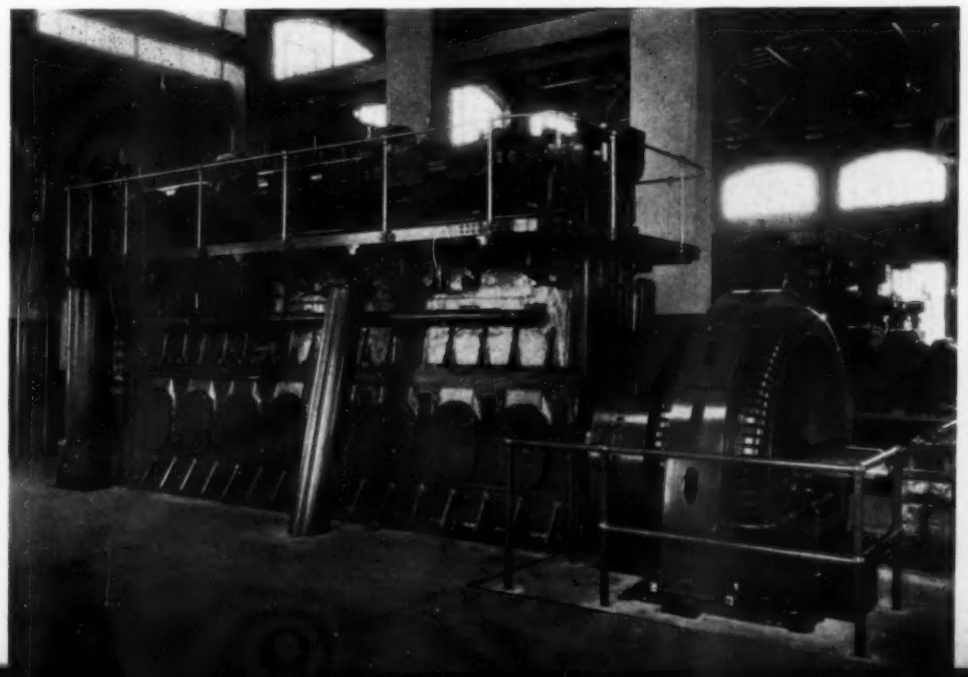
The building as erected and containing but three engines with their appurtenances, was purposely made sufficiently large to accommodate a fourth engine in anticipation of eventual future needs. The demands for electricity increasing continuously, necessitated the installation of a fourth unit in 1928. Again a Busch-Sulzer was chosen, but this time one of 600 bhp. with a direct connected generator of 400 kw. capacity. The municipal power house is shown in Fig. 2.

The building is of monolithic reinforced concrete frame the interior sub-divisions are by means of brick curtain walls. The roof is tar and gravel on a reinforced Pyrobar slab deck. The windows are of the steel sash variety throughout. The demand for electricity rose constantly and in 1936 an addition to the plant had to be erected to provide space for a fifth engine. The choice fell again upon a Busch-Sulzer; a large 1,000 bhp., 8-cylinder, 4-cycle Diesel driving a 700 kw. generator. The 1936 plant layout with the new large Busch-Sulzer Diesel in the foreground is shown in Fig. 3.

Clean, grit-free lubricating oil is necessary for Diesel engine operation, and at the Madison power plant special precautions are taken. A DeLaval oil purifier is installed and under normal operating conditions each of the five engines is set at rest for a few hours during each 24-hour period. This allows ample time for the purification of the lube oil of each engine while the latter is out of service; the oil from each engine being passeed through the purifier at least three times during each week even under the most prolonged service schedule. The centrifugal oil purifier is shown in Fig. 4.

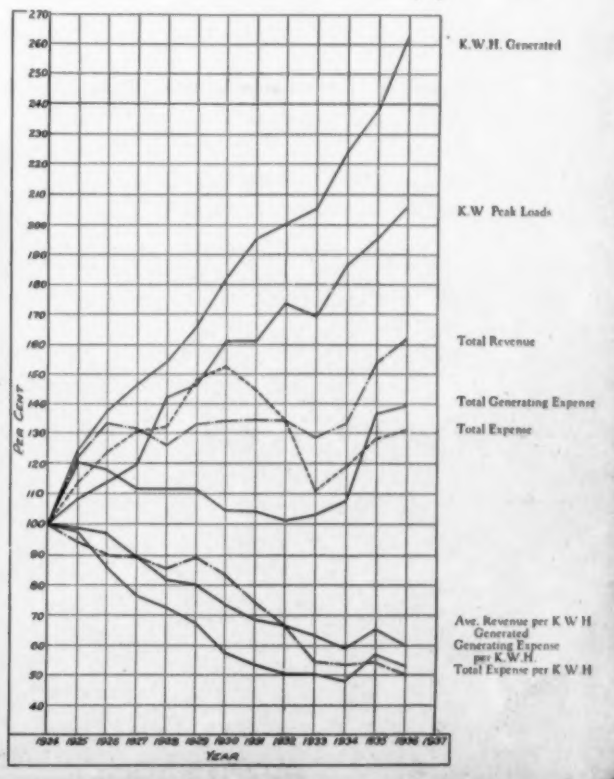
While the Madison Diesel-electric plant was erected and is operated by and for the citizens of this municipality, its administration is nevertheless strictly upon a public utility basis. The city is not playing Santa Claus nor are the citi-

Fig. 3. Interior, Madison Electric Plant, 1936.



Thirteen Year Comparative Records

[Expressed in percentages with figures of 1924 as basis (100%)]



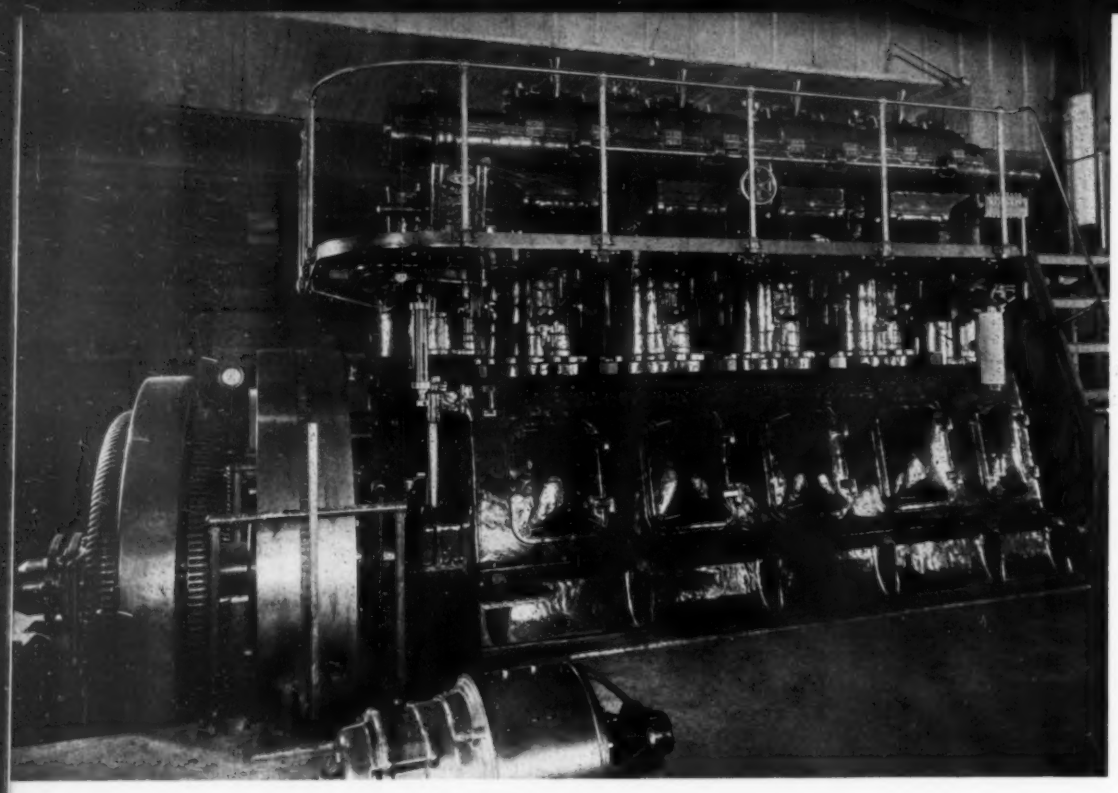


Fig. 6. Busch-Sulzer Diesel.

zens' tax-moneys wasted supporting a plant. The operating costs and profits, the savings accruing to the citizens of Madison by virtue of its municipally owned electric plant, are tabulated in the chart, Fig. 5.

In order that the full significance of the above chart be apparent, it must be said that the current furnished for the light of the public schools, library, City Hall and garage, park, water and sewer departments, and street lighting (some 300 lamps), while cost free, represent at a nominal value, an amount exceeding $23,000.00 per annum.

At Madison, every store, shop, business or industry uses electricity and in addition to this, 99 per cent of the city's homes. That may be a surprise to those who expect so-called "country towns" to be lit mainly by kerosene lamps even if not candles! Electricity in 99 per cent of the homes indicates a percentage not reached in a metropolis such as New York for example, where thousands of homes are still lighted by open gas-flames (not the Welsbach mantle type), and where kerosene "wick pots" are yet to be found Size does not necessarily indicate progressiveness.

A municipally owned electric plant cannot only furnish current at a decidedly lower rate than could be had from a public utility, but such a plant may also be a source of revenue. The financial angle may be illuminated by the following:

In 1909, Madison went into debt to the extent of $14,000.00 in order to purchase producer gas engines. In 1919, another bond issue amounting to $100,000.00 was floated. This money was used for the erection of a new plant (the old one having been destroyed by fire), and for the purchasing of Busch-Sulzer Diesels, as stated previously. During a 13-year period, 1923 to 1936, these two bond issues were retired from earnings and in addition, really large amounts of money were made available for other civic purposes, to wit:

Electric Light Bonds retired	$114,000.00
Net transfers from Electric Dept. to other city departments	156,917.66
Water works improvements, balance of cost of City Hall	14,858.52
City Hall account	26,820.68
Invested in sewer bonds	11,000.00
Miscellaneous bills paid for other city departments since 1931	4,782.98
Extensions and Improvements to Street Lighting System; Distribution; and Plant	290,552.40
A grand total for a 13 year period, of	$618,932.24

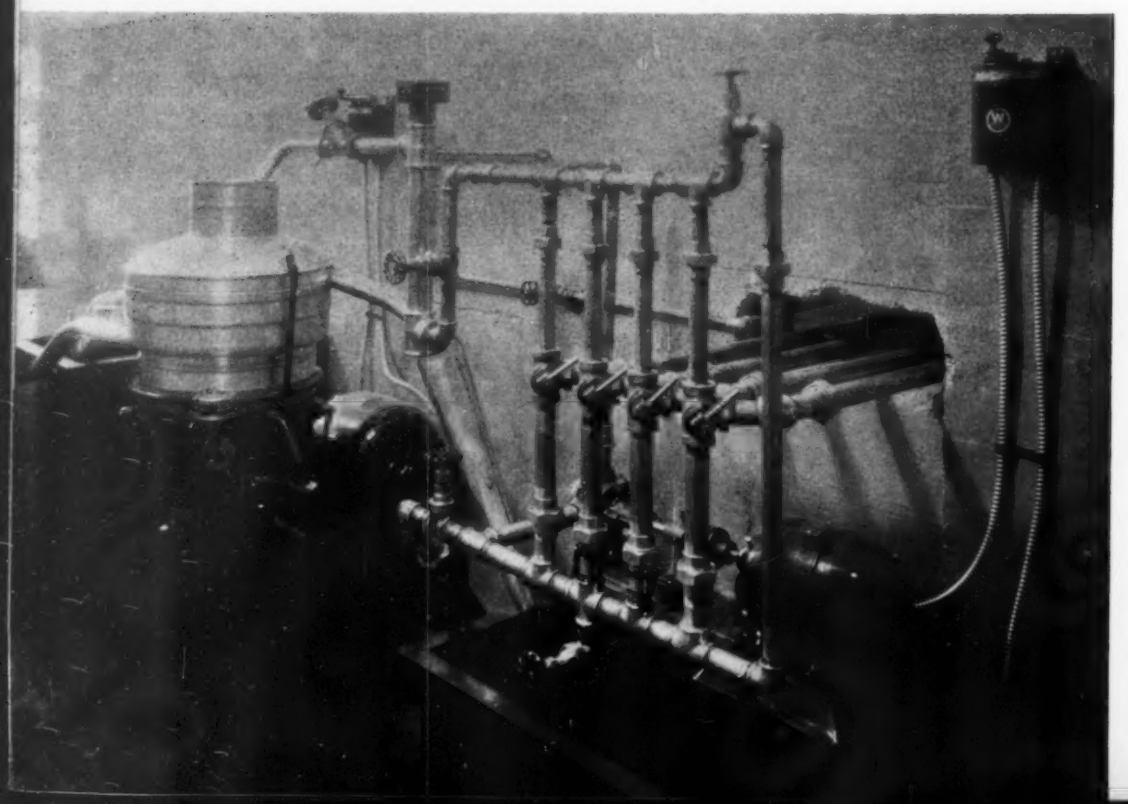
The City Hall of Madison, locally known as the Municipal Building, was paid for not by a bond issue requiring a goodly portion of the taxables-rates for interest charges and amortization, but from the excess profits of the Electric Light Plant.

Public utilities are wont to stress the "obsolescence bugaboo" (mainly for purposes of high-rate fixing); but what is obsolescence in reality? The Operating Record Fig. 5, shows, that the original Busch-Sulzer Diesel is still in operation; 23 years of service. In the light of this fact one is permitted to smile when someone, misinformed, mentions the terror called — obsolescence.

Thus the citizens of Madison enjoy low electric-current rates; the excess profits from plant operation are used for civic purposes, and the inhabitants are free from outside exploitation. And all of this has been accomplished by public-spirited self-effort. The immense growth in demand is illustrated in Fig. 7, the graphs are silent testimony to the effect that people will make use of cheap electricity.

Madison is an example of sturdy American pioneer spirit, and furnishes the answer to the query often heard: "Does it pay a municipality to have its own electric plant?"

Fig. 4. Centrifugal oil-purifier installation.



DIESELS ENTER CALIFORNIA OIL FIELDS

By GEORGE D. CROSSLEY

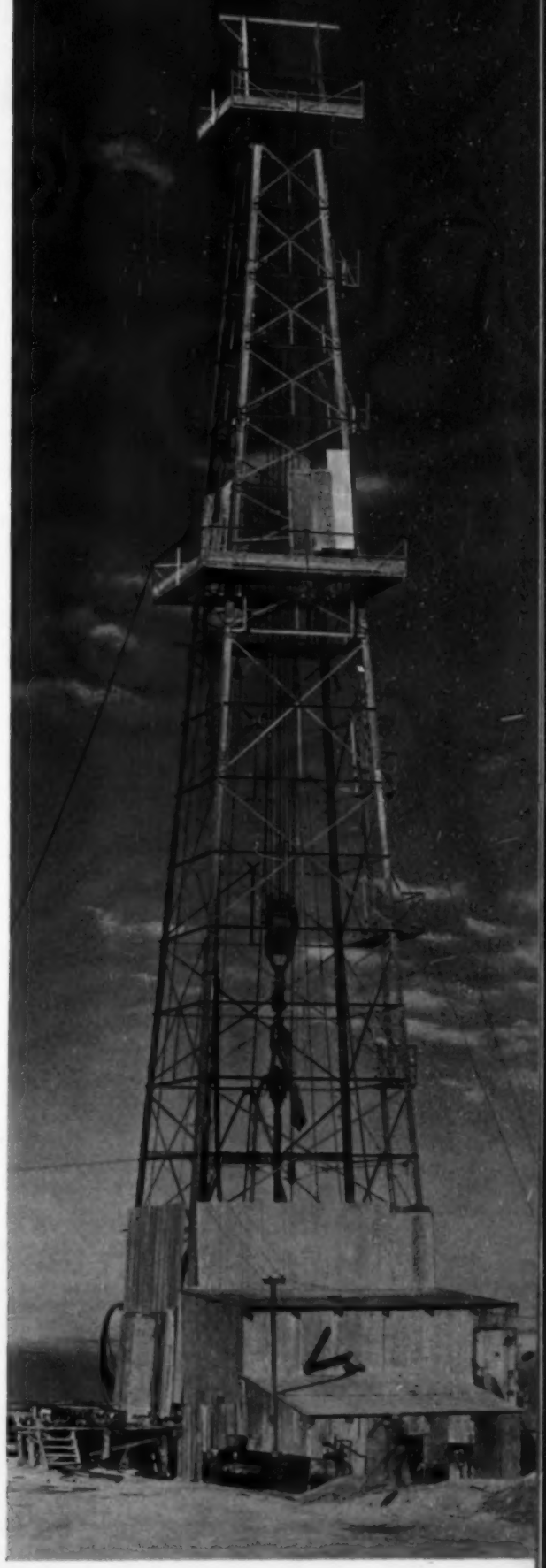
DURING recent months the number of Diesel engines delivered to California oil well drilling companies has shown a decided increase. An installation of two Cummins 200 hp. Diesels on a Wilson Drilling Rig owned by the Kern Drilling Company has aroused attention because of the exceptionally low operating cost. This rig was operating at Coalinga, Calif., drilling for the Superior Oil Co., at the time the operating cost tests were made. On a 24-hour day basis, th two engines burned a total of 210 gallons of fuel, which cost, delivered, 5½ cents per gallon. The lubricating oil consumption was only 1¼ gallons per 24 hours for both engines.

Commenting on these costs, the Kern Drilling Co. pointed out that the total cost of operating the Cummins powered rig was $12.43 per 24 hours, and that this was approximately one-half the cost of operating with Butane, and one-fourth the cost of steam.

The Iniskin Drilling Company of Los Angeles is taking delivery of a Cummins 200 hp. Diesel for its operations, and the H. L. Whiston Co., of Bakersfield, recently took delivery of a Cummins HP-600, 85-100 hp., Diesel power unit.

The Cummins HP-600 Diesel is a complete power unit, consisting of the engine mounted on a structural steel base which also supports the radiator, fuel tank and clutch power take-off. Starting is through a 24-volt electric system. The engine drives a Gardner-Denver 7″ x 10″, 1,500-lb. pressure pump. Engine and pump were assembled by the Republic Supply Co., distributors for Gardner-Denver products.

The two 200-hp. Type LP 600 Cummins Diesels which drive the Wilson Drilling Rig and Slush Pump.



The derrick and draw works at Coalinga, Calif.

CARL HUSSMAN—ENGINEER

By REX W. WADMAN

EMERSON many years ago wrote that the world would beat a path to whoever built a better mouse trap. I have often doubted that such a thing, in this modern day and age, could or would happen, but I have had to change my mind – it has happened. Last week I walked down a path that had been well beaten and trodden by people who wanted and who fortunately found a better spring base. At the end of this path I found Carl Hussman – Engineer, specialist in solving sound and vibration problems.

Vibration abatement is one of the most important problems confronting the Diesel industry at this time. We have lost many sales in the past through inability to control the transfer of vibration from the Diesel power plant to the surrounding buildings. We have limited our sales possibilities a great deal in the past because of this problem and we would have immeasurably limited our sales in the future had not many of these problems been solved by Carl Hussman.

The widening of our base of operations in this Diesel industry brought about by such units as General Motors "packaged power" and similar compact, reasonably small units, has made it vitally necessary for us, as an industry, to be able to solve problems of machinery vibrations and it is because of the importance of this subject that I am taking these two pages to tell you – the readers of DIESEL PROGRESS – about Carl Hussman – Engineer, and what he has accomplished and can accomplish in the solving of vibration problems. I feel that the industry as a whole should know about this man because of what he can do for the industry. He is not a merchant, he is not a manufacturer but he is one of the most capable engineers it has ever been my pleasure to meet.

Hereunder I am briefly commenting on some of the vibration abatement problems he has solved. In a later article, I will go into the technical end of his various types of spring suspensions and will follow this up with a technical article on sources of vibrationary disturbances and the equipment necessary to abate these disturbances.

To get back to Carl Hussman and his better mouse trap, I refer you briefly to figure 1, which illustrates the type S M. Mounting, applied to a single-cylinder, auxiliary Diesel generating set, supplied by the Winton Engine Corporation (now General Motors Corporation, Diesel Engine Division). Two of these sets are installed in Mr. George W. Codrington's Diesel express cruiser, "All Alone II" and have proved to my certain knowledge, extremely satisfactory. The patented spring suspension, elevated above the center of gravity of the machine, combined with base springs for the control of lateral movements, insures stable operation of the set, without excessive motion, even while the ship pitches and rolls in a heavy sea. And yet, all springs function freely, and without interference. A locking arrangement is provided, which bolts the engine solidly to the seating, for shipping, and on board, should circumstances arise to make this necessary.

The illustration shows the principal dimensions. Demountable spring supporting columns simplify the installation on board. Propelling engines, of smaller size, can also be isolated most effectively with this type of mounting. It is necessary, however, that the propeller thrust be removed from the engine and the mounting, which is accomplished by relocating the thrust bearing, which is normally located in the engine.

Fig. 2

Much of Mr. Hussman's work recently has been in solving problems created by other manufacturers of spring suspensions whose recommendations have been wrong. A typical example of this is given in figures 2 and 3.

The body of a motor-driven truck may be considered as unusually flexible, and, therefore, as highly sensitive to vibrations. Nevertheless, most effective isolation from the disturbances of a three-cylinder Diesel engine was accomplished by a truck mounting, Type T, after a competitive spring mounting had failed.

Figure 2 shows the Type T mounting, supporting a Winton, three-cylinder, 35 kw. Diesel Power Plant, transported by truck, and supplying both power and light for the GM Parade of Progress Caravan. Figure 3 illustrates the arrangement of the adjustable spring suspension, and the locking device, provided for bolting the

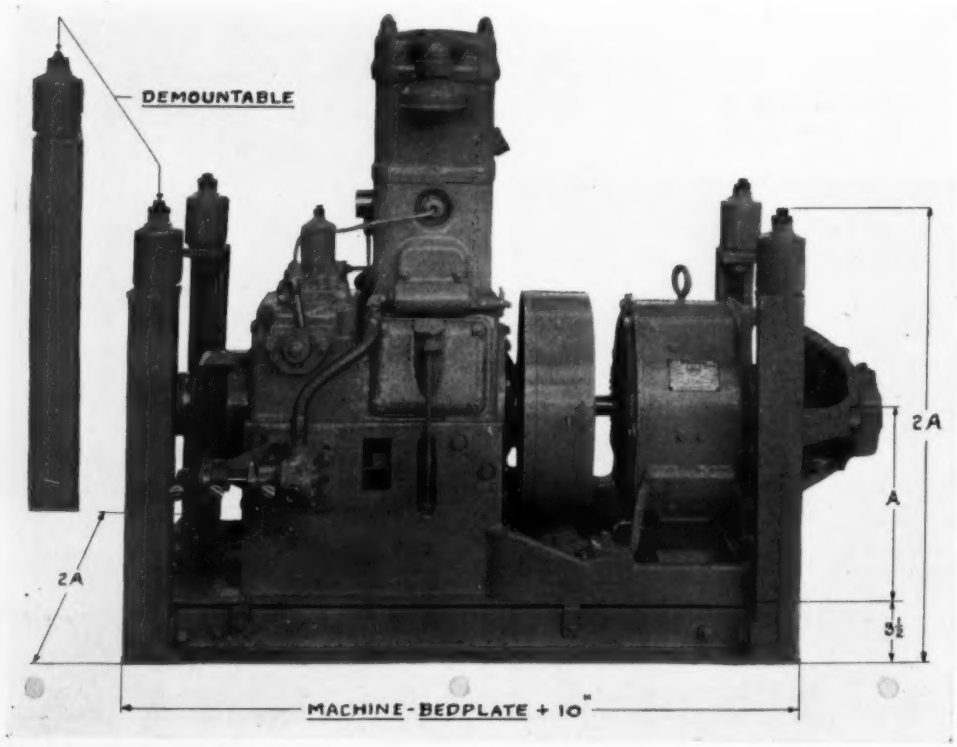


Fig. 1. Marine Diesel Auxiliary Generating Set on a Hussman Spring Base.

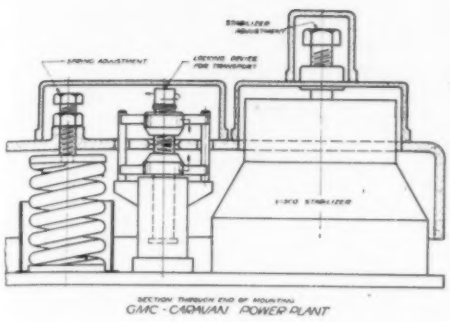


Fig. 3

engine solidly, for transport, without changing its position in any way.

Stabilization is obtained by Visco Stabilizers, located at the four corners of the mounting. This device insures absolutely stable operation of the engine unit, not only at normal, operating speed, but also during the resonance periods, in starting and stopping, with the provision of the minimum amount of damping required.

Another instance of lack of careful study in recommending a vibration abatement program is typified by the following case history from Carl Hussman's files. . . . A spring, properly designed, made of the correct material, with proper heat treatment, and correctly applied, will not break or lose its resiliency through fatigue. This may appear doubtful to some engine owners, or operating engineers, and their minds can be put at ease by arranging the springs in such a way that they are fully visible at all times for examination, and can be conveniently removed and replaced, if desired. Type O fulfills these requirements, as illustrated in Figure 4.

The engine equipment, in this case, consists of two National Superior Diesels, 9 x 12, 600 rpm., with generators, exciters and pumps. This equipment was originally placed upon heavy, concrete foundations, isolated with cork at the base and on the sides, and built at an extraordinary expense. This method of isolation proved an absolute failure, due to excessive vibration which disturbed the entire neighborhood of the power plant. After the change was made, and the spring mountings were in operation, the chief engineer reported "a 100 per cent satisfactory performance of the engines and absolutely perfect vibration absorption."

One of the problems with the foregoing installation was the requirement, that the original position of the equipment – as installed on the concrete foundations – was to be accurately maintained. This was accomplished, so that the pipes and conduits could be reconnected with practically no changes, with the exception that flexible connections were provided in the exhaust piping. The engine, upon the springs, operates quietly and smoothly and without quiver, to speak of, which is indicated by the fact, that rigid pipe connections were employed, except the exhaust without fear of breakage.

Through the large amount of work that Carl Hussman and his associates have now done in connection with Diesel installations both marine and stationary, he has developed a standard method of providing spring isolation. The standard method of providing spring isolation, for stationary Diesel generating sets, is by the application of the Type U Unit Mounting. as shown in Figure 5. An all-steel housing, of welded construction, consists of cover, which is tapped for the holding-down bolts of the engine, and a heavy base plate with spring enclosure. The springs are seated, top and bottom, by washers made of Tex-O-Mat, an impregnated, woven material, which is highly suitable for this application, and has the principal purpose, of preventing the transmission of high frequency sounds through the spring unit. A locking arrangement permits partial pre-compression of the springs, which makes the unit compact and suitable for shipment. Loading the unit with the normal operating load, will further compress the springs to the required degree, which automatically releases the locking pins, so that the top of the mounting becomes free-floating. By removing the load from the unit, the locking arrangement is automatically reapplied.

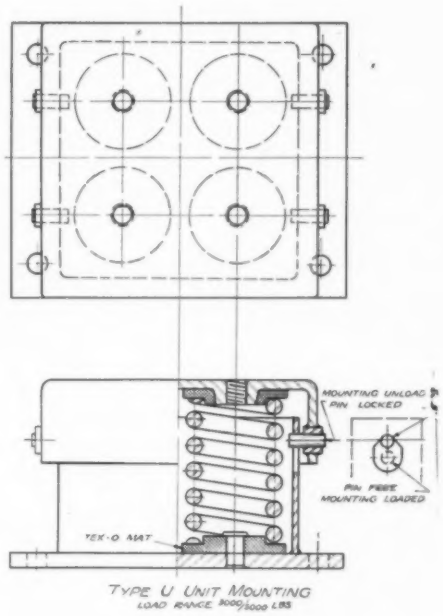


Fig. 5

In going through his files I came across another interesting case history, many details of which had come to my attention when this particular four-cylinder engine was installed in a municipal plant. Eventually, it was removed from this plant and a six-cylinder engine installed in its place. Later, this four-cylinder unit was sold to the American Envelope Company at Carrollton, Ohio, and Figure 6 shows, diagrammatically, the application of the Type U Spring Mounting, under a Winton, four-cylinder, 235 kw., 320 rpm. Diesel power plant. Here, as in the previous case, spring mountings were installed, after a cork-isolated foundation mass, of considerable proportions, had proved unsatisfactory. Now the equipment operates smoothly, without excessive oscillation, with a degree of isolation close to 100 per cent, spring suspended, with a total spring load of over 125,000 lbs. Bear in mind that here is a big engine operating at comparatively slow speed, direct-connected to an accordingly large generator and yet Carl Hussman successfully solved the problem of vibration abatement on this installation to the complete satisfaction of the present owner.

In conclusion, the elimination of machinery vibrations and noises represents a task which can not be solved schematically according to any given set of patterns or recipes. Only by individual study and treatment, based on long years of experience and specific research, can a satisfactory outcome be guaranteed. For such analytical research, I highly recommend Carl Hussman – Engineer. You will find Quickmail Coupon No. 31 a convenient way of getting in touch with him.

Fig. 6

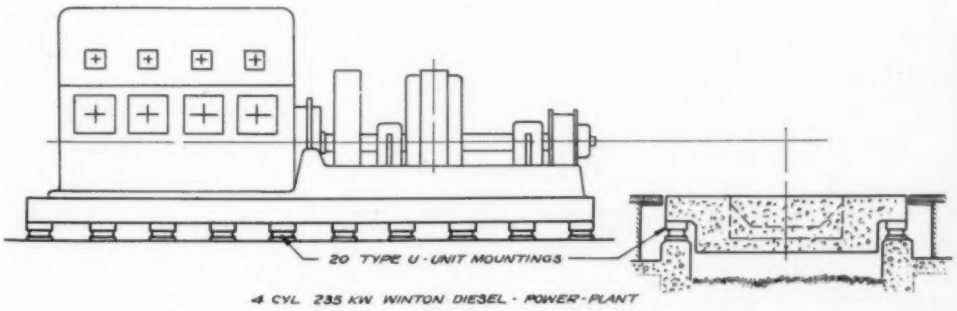
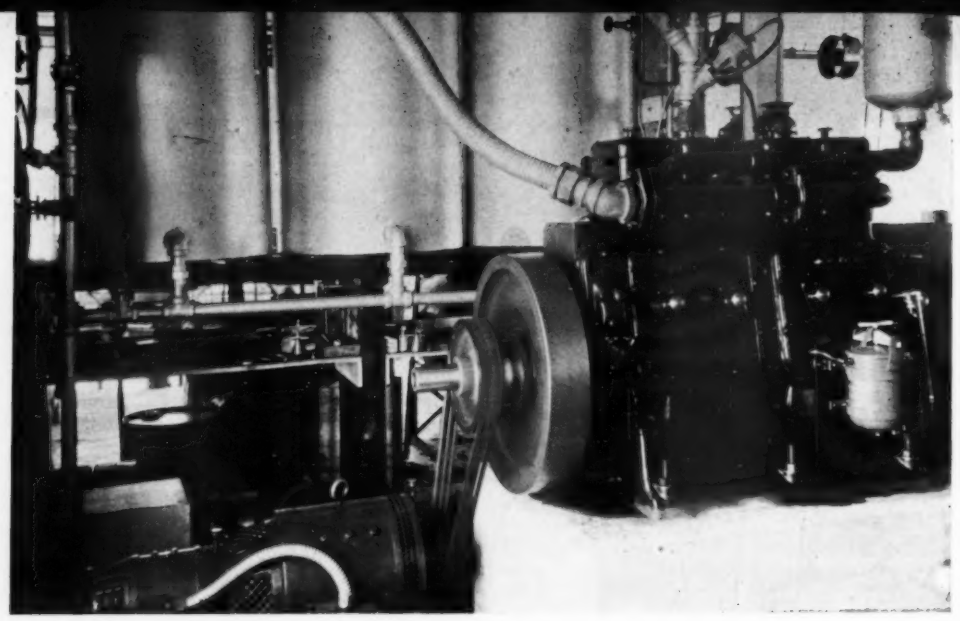


Fig. 4

WATERVILLE MANUFACTURING COMPANY

By OTIS A. SIBLEY



Generator end of the 38 hp. Lister Diesel. The flat belt power take-off to the lineshaft appears indistinctly at the extreme right.

NEW ENGLAND manufacturers have long been noted for their thrift and ingenuity. It is not surprising, therefore, to find another typical example of Diesel economy in the plant of the Waterville Manufacturing Company of Waterville, Connecticut. Originally electric power was purchased for a former plant from the local utility and was used to operate three automatic screw machines with an individual maximum load on the overhead line shaft of only two horsepower. Even this small load represented an average monthly power charge of thirty dollars, which was gradually doubled to sixty dollars, as business increased and three more machines were added.

At this point it was decided to install a 16 hp. Diesel engine which was belted directly to the line shaft. Current for lighting was supplied by a 2 kw. generator driving from this common shaft. Although operating on a relatively small scale, the saving in power charges was a large percentage of the former utility bills so, when the time came for further expansion, a new and larger Diesel power plant was a foregone conclusion. The new factory produces automatic screw machine products such as bushings, inserts and screws made from brass, steel, aluminum and other metals. Machinery now includes fourteen screw machines, a variety of lathes, shapers, grinders and miscellaneous machine tools representing a substantial increase in the power demand over the original plant.

The new Diesel, furnished by Peet & Powers, Inc., is a 38 hp., four cycle, Lister, belted to an electric generator at one end and the familiar line shaft at the other. Savings in light and power bills more than justify the expenditure of $2,300.00 for the engine and $500.00 for the generating equipment. In fact, this entire capital outlay will soon be completely amortized out of savings. The 5 kw., 60 cycle, 3 phase generator operates through a V-belt at 1,800 rpm., while the line and counter shafts, fitted with tight and loose pulleys for the individual machines, are driven through a flat belt and clutch.

Auxiliary Diesel equipment includes a W.B.G. lubricating oil clarifier which is a cartridge type filter, a Staynew air filter, which serves also as an intake silencer, and flexible metal exhaust hose to prevent vibration transmission to the muffler. The thermo-syphon principle is employed to govern the circulation of jacket cooling water from three all-welded steel tanks. As a result of this arrangement, a warning signal is sounded whenever the temperature of the cooling water increases beyond a previously determined safe limit. Warning is also given should the lubricating oil pressure drop to a dangerous point. Under these circumstances, it is possible to operate the Diesel without continuous attention, safe in the knowledge that ample warning will be forthcoming automatically before any damage is caused to the equipment.

Mr. Harold Close, President of the Waterville Manufacturing Company, is mainly responsible for securing such an economical and reliable power supply. Since installing his first Diesel unit, he has had ample opportunity to observe and evaluate the merits of Diesel generated power from a thoroughly unbiased viewpoint. His present enthusiasm for the new unit is the best possible recommendation for others who may be considering a similar installation.

The "Western Explorer" leaving for the Eastern Shore.

THE VOYAGE OF THE "WESTERN EXPLORER"

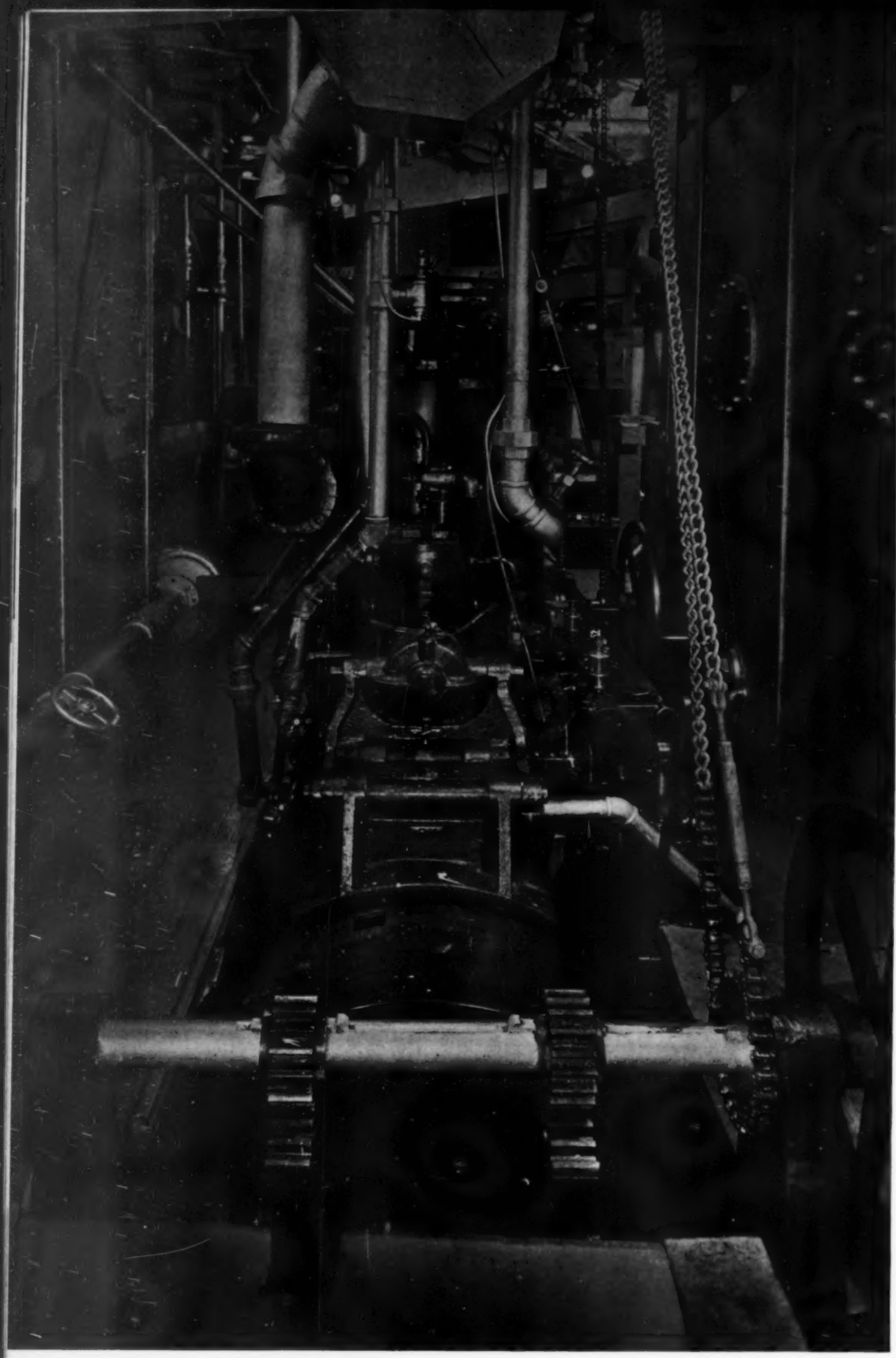
By CHARLES F. A. MANN

IT was a big day for the shipbuilding industry of the Pacific Northwest, particularly, for the two-score shipyards which specialize in the construction of Diesel-powered fishing vessels. They made history in America's fishing industry, when the new Diesel-powered *Western Explorer* left Tacoma harbor, April 24th, for the long voyage through the Panama Canal to Gloucester, Mass.

For the first time in the history of the American fishing industry, a Pacific Coast fishing vessel was built for operation on the Atlantic Seaboard. As far as the records go, the same exclusive status covers the Canadian fishing industry, also.

Nearly 50,000 people and a fleet of over 300 assorted power craft participated in a monster Marine Carnival, as a send-off party for the *Western Explorer*. The officials in Washington, D. C., wirelessed and telephoned their congratulations. Two national broadcasting systems carried the description of the celebration up and down the Pacific Coast. San Francisco and Oakland prepared, and later, gave a warm and noisy welcome; likewise a broadcast was given over a radio hookup. San Pedro

The Pilot and the automatic-electric steerer.



Engine Room, Looking Forward.

and San Diego "waterfronters" joined-in with publicity. All this fuss over an 81-foot husky Pacific Coast purse seiner with a 200 hp. Atlas Imperial Diesel engine for power!

But it marked a historical point in the penetration of the peculiar type of Diesel-powered purse seiner into all branches of the American fishing industry. For five years, Martin Petrich, president of the Western Boat Building Company, had dreamed of the chance to take a de luxe type, fully equipped purse seiner of the type he first began building 30 years ago, to Gloucester, Mass., to teach the staid old Massachusetts fishing men the Western method of catching fish in big purse seiners, by encircling a whole school of fish quickly and without fuss. The purse seiner has extended its usefulness into the sardine," tuna and mackerel industry, and has made records equal to that already made in the salmon fisheries. Now the Coast type will go to Gloucester and show the oldest fishing industry in America a few tricks about catching Atlantic tuna and mackerel.

The *Western Explorer* is a joint venture of Mr. Martin Petrich personally, and of his family-controlled company, the Western Boat Building Company. Son Hervey Petrich is the "Second in Command" for the venture, and is taking the craft to Gloucester. The Atlas-Imperial Engine reliable four-cycle, trunk piston, direct reversible Diesel engine is already busy in the engine rooms of over one thousand Pacific Coast fishing craft.

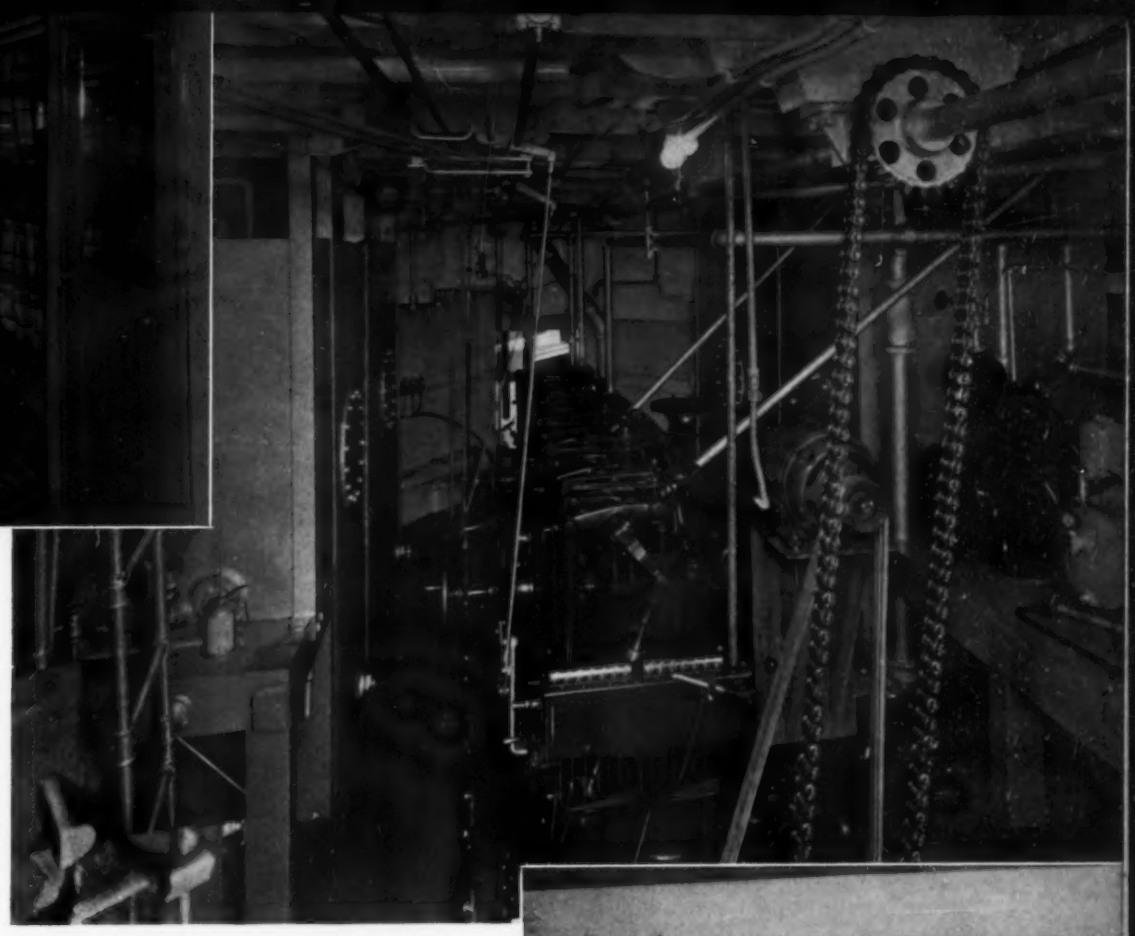
The ship's hull is No. 130 on the books of the Western plant, representing a gross investment of about $50,000. It is a perfectly finished husky wooden vessel of the type that has already proven as high as 40 years in the salt water without excessive damage from rot of any kind, and it is practically of 100 per cent Douglas Fir construction, with the traditional one-piece keel, cut from a single giant Douglas Fir over 95 feet long!

Where else in the world can such magnificent ship lumber be found? Her ribs are practically solid 12 x 12s, spaced close together (two 12 x 6s in places, spiked together). Her hull is double planked and the deck beams would do well on a 300-foot craft. The entire engine room is placed so close to the bow of the vessel one wonders how the vessel stays in trim. A trick of excessive flare forward, below the waterline! The forward end of the Atlas Diesel power plant is directly below the steering wheels in the pilot house.

The vessel is 81 x 21 x 9 ft. 8 in. x 8 ft. draft, and has a gross tonnage of 113 and a net of 73. She will carry 140 tons of sardines (maximum loading) in the six-compartment fish hold, located directly under the net turntable on the after deck. The turntable will hold 3,000 ft. of seine net up to 180 ft. wide, and is equipped with power rolls driven from the famous "lineshaft drive" system employed on this type of vessel.

A unique simplification of auxiliary power

The Bunks, "Western Explorer."



Main Engine and Auxiliaries "Western Explorer."

aboard fishing vessels, this rig consists of a 2½-inch line shaft strung along the ceiling of the engine room, from one end of the hull to the other. A double clutch on the main Diesel, and a "sailing clutch" between the main engine and the propeller shafting, permits the main Diesel to rotate through a simple chain drive to the line shaft. The windlass on the forward deck, the gypsy on the aft deck; certain pumps and the turntable power rolls, are independently clutch-connected via auxiliary chain drives to the line shaft. Thus, without a second Diesel for auxiliary power or complicated separate electric drives on each piece of auxiliary deck machinery, the entire boat is powered simply and economically with no more than the reliable main Diesel engine below deck. When not fishing, the line shaft is coupled off the main engine, and the sailing clutch is thrown in, giving a complete reversible Diesel-drive with all power on the propeller. A three-bladed Coolidge propeller is used.

And they save 15 per cent of the cost of the entire vessel with this ingenious drive – largely pioneered by Mr. Petrich. His own company constructed most of the deck machinery and parts for this auxiliary drive system.

Down in the engine room, the 6-cylinder 200 hp. Atlas Diesel is arranged, so that the actual operating controls can be worked from the pilot house or the engine room. A catwalk raised above the engine bed gives ample room in the engine compartment. The main engine operates up to 325 rpm. In the forward part of the engine room is a 28-cell 110-volt Willard battery set, receiving its "juice" from a 1½ kw. Westinghouse generator, belt-driven from the main engine flywheel. A McDonald fresh water and salt water system, both motor driven, are fitted on a shelf on the port side of the engine room. On each side of the engine are 1,500-gallon fresh water tanks; a 300-gallon lube oil tank and a 2,500-gallon fuel oil tank, equally divided on both sides. These are of all-electric welded steel. Another 2,500-gallon fuel supply tank is carried in the stern. A two-bottle CO_2 fire fighting system is fitted in the forepeak. A Western Boat Building Co. 3½-inch centrifugal pump is chain driven from the main engine by means of a cut-out clutch, for bilge, fish hold, fire and deck pumping. Two Sentinel oil filters supplied by the Diesel Filter Co. are fitted for filtering the lube and fuel oil. The remainder of the deck machinery was built by the Western Boat Building Co.

The navigation equipment is outstanding. The latest de luxe Photoelectric Pilot and electric Automatic Pilot are fitted, supplied by the Photo Electric Pilot Co. This unusual and very compact electric steering and pilot system has already been fitted on over 100 Pacific Coast craft. It operates directly on the steering gear, with automatic steering wheel and hand steering wheel placed together. The motor and compass control is fitted in a small compartment in the Captain's room below the pilot house. The main engine controls are extended to the pilot house. A Northern Electric Co. radio sending and receiving telephone set is installed, deriving its electricity from a small AC-DC converter in the engine room, which also supplies the Photo Electric Pilot.

The Galley of the "Western Explorer."

The small six-inch steering wheel controls the electric steering, or by simply pushing a button, the vessel will automatically follow any set course without further attention.

. . . . *And now please turn to page 53*

YEAR 'ROUND ICE-PLANT OPERATION WITH DIESEL ENGINES

By B. J. VON BONGART

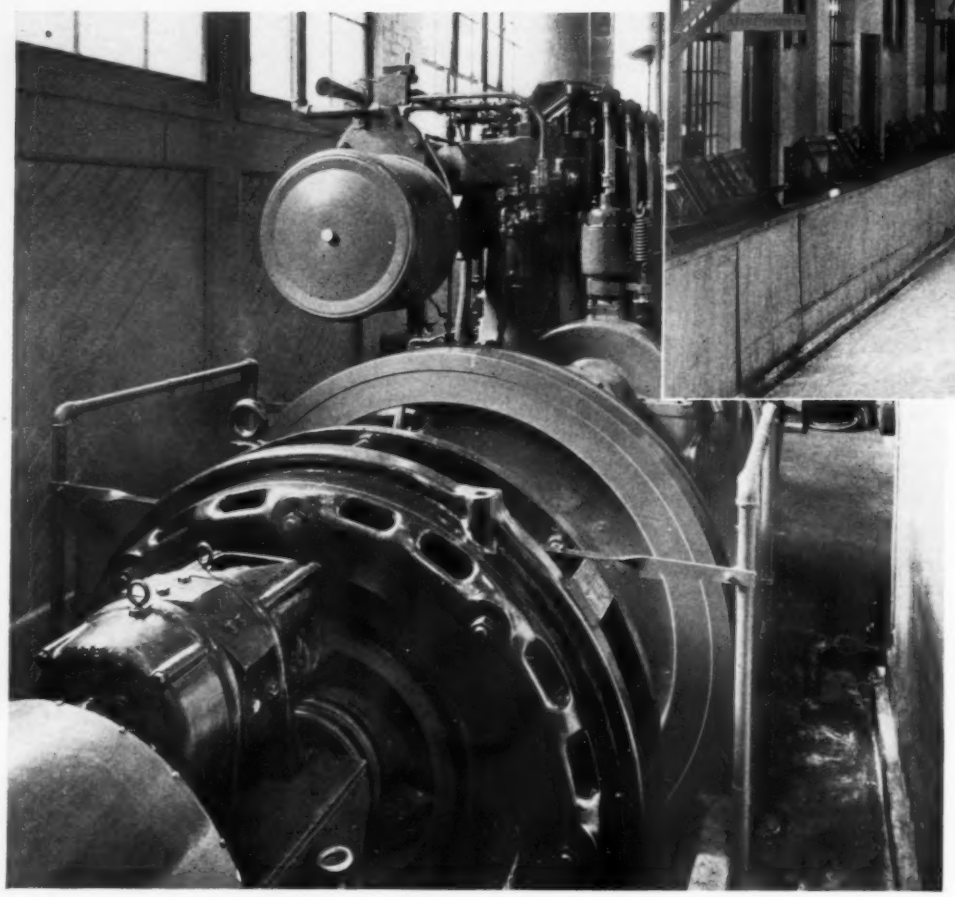


Fig. 1. Chicago Pneumatic Diesel operating two compressors and a generator.

OPERATING an ice-plant with power furnished by Diesels rather than by steam engines reduces the production cost of ice considerably of course, but that fact in itself does not make an interesting story.

Generally speaking, ice-plants operate either on a part time basis (during the summer months only), or on a reduced schedule during the winter months. In either case, the yearly and constant overhead must be borne by the revenue realized by virtue of sufficiently profitable production, in spite of the fact that such production periods may be of very limited duration. The management of the White Plains Ice Service of White Plains, New York, has solved this problem in a unique manner.

The plant of the above concern is gaited for the production of seventy-five tons of ice per day for the season April to September. The power is furnished by a Chicago Pneumatic 5-cylinder, 4-stroke cycle Diesel of 200 hp., operating at a speed of 327 rmp. The engine is directly connected to two compressors, one at either end, and the former also drives directly an Ideal Electric 50 kw. generator, which is interposed between the engine proper and one of the two compressors. It is a simple arrangement, eliminating at one stroke belts and chain drives, transmissions, etc., power being thus generated and absorbed in a straight-line arrangement. The above-mentioned generator supplies electric light for the ice-plant and current for extraneous electric motors used for various purposes. The installation is shown in Fig. 1.

The control board of this plant is of Ideal Electric & Mfg. Co. design, featuring Roller-Smith volt and ammeters and Ideal field rheostats. A general entrance switch, as manufactured by the Commercial Control & Device Corp. of Brooklyn, New York, and a Cutler-Hammer automatic starter complete the electrical control equipment, and a Century polyphase induction motor furnishes the power for various pumping services. The Chicago Pneumatic Diesel is in constant operation 24 hours per day, day after day. The engine was first started in January, 1937, and is still running. Since this fact speaks for itself, comment is superfluous.

As said before, the ice business is essentially a hot weather business. During the winter months the demand for ice diminishes to such an extent that some plants shut down entirely while others operate with a production schedule so curtailed that neither the running expenses, much less the overhead, is met. A complete shut-down may be the best compromise from a cost standpoint (the twelve months' overhead to be charged to the six revenue producing months), but this is not always possible, since there are customers to whom ice must be served during the winter months, even if it is not profitable for a plant to produce ice on a severely reduced schedule. This problem has been met successfully by the White Plains Ice Service by operating the Imperial Ice Skating Rink during the off months, September to April. The skating rink is shown in Fig. 2.

This skating rink consists of a huge arena requiring the production of from twenty to forty tons of ice per day, depending upon weather conditions. It is a mecca for the younger element of White Plains and vicinity, since aside from the crystal skating floor, restaurant services are also provided for, adjacent to the rink. The latter is open to skaters every afternoon

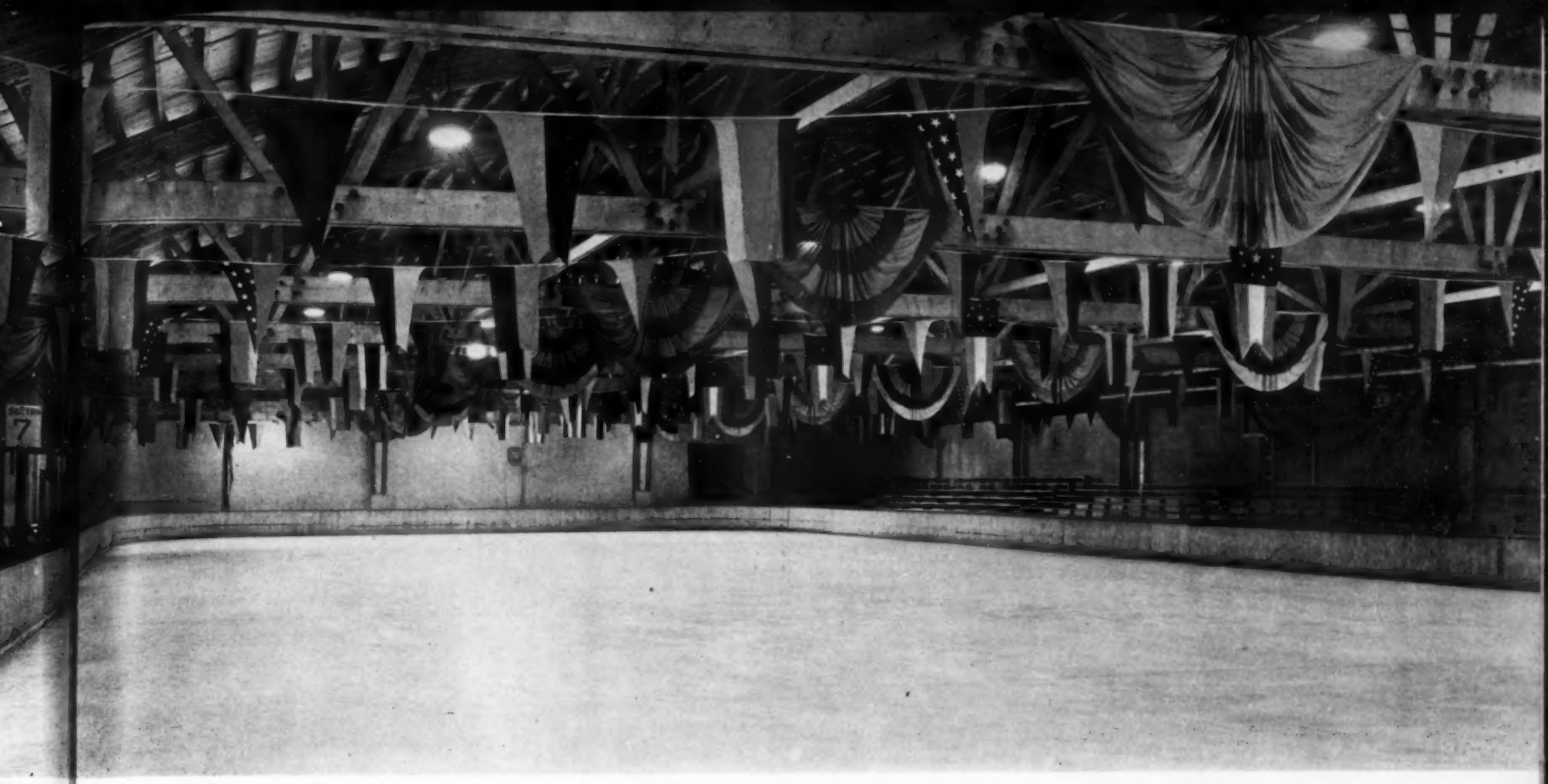


Fig. 2. Imperial Ice Skating Rink.

and evening and produces not only worthwhile revenue for the White Plains Ice Service but perhaps mainly, even if not wholly, a definite and constant outlet for from twenty to forty tons of ice per day, hence the continuous operation of the ice plant is thus justified and made economically possible.

The illumination of the huge arena, restaurant, etc., is provided for by means of a separate Diesel-electric plant. Here, two 6-cylinder Cummins Diesel engines of 4⅞-inch bore and 6-inch stroke are coupled to a General Electric, 112½ kv-a., 208/120 volt, 3-phase generator operating at 1,200 rpm. in such a manner that the latter, being mounted between the two Diesels, may be driven by either one of them. The engines are operated alternately, being set in motion by Leece Neville electric starters, and a day's run consists of 16 hours of continuous operation, being from 9 A.M. to 1 A.M. The normal demand calls for an output of 35 kv-a. which is readily met by one engine; if, however, extra demands are made for floodlights in the arena, such as are occasioned by a carnival or special performances, the second or stand-by engine is then started up, the generator being amply large to absorb the power from both engines and thus a superabundant amount of current is instantly available. This dual-engine but single-generator arrangement is indeed a desirable one. It provides first of all, a stand-by engine for emergency or heavy duty service besides allowing for alternative operation of the engines. Its main feature, however, lies in the fact that the Cummins Diesels in this installation may be operated by help inexperienced in matters electrical – there can be no difficulties in synchronization since there is but one generator – and the power demand may thus be readily transferred from one engine to the other while running, or the load may be divided between both engines. This angle is noteworthy and of greater importance to operators than it may seem to the uninitiated.

The electric appurtenances include Ward Leonard automatic voltage regulators, Federal and Murray safety switches. The lighting plant is thus self-contained and automatic in operation, needing no attention beyond starting in the morning and stopping after midnight. The electric system being the automaton-watchman always on duty. The engines are equipped with Cuno oil filters and Skinner streamlined purifiers for the fuel oil, and a Nugent filter for the lubricating oil. The two Cummins engines are equipped with Maxim type SO2 spark-arresting silencers, the Chicago Pneumatic Diesel engine with type DO4 Maxim silencer. The Cummins-Diesels are shown in Fig. 3.

The White Plains Ice Service has thus inaugurated a method assuring a somewhat balanced ice production the year 'round, which not only yields constant revenue but prevents the accumulation of overhead costs. To communities, however, the dual use of ice producing facilities has a decided social value quite aside from the financial emoluments accruing to the plant owners. The providing of healthful exercise and clean entertainment, which while here perhaps intended mainly for the younger element of the citizenry, is, in its wider scope, a public duty of the body politic.

White Plains is a small city of but 36,000 inhabitants – there are some twenty cities in the U. S. similar in size, not to speak of the larger ones – yet, the combination of ice-plant and skating-rink is a happy solution of the problem which all ice companies face today (it is of no avail to curse the electric refrigerator) and far-sighted men in the ice industry may well consider the possibilities as existing in numerous cities all over the country. An idle ice plant, or one operating on a half-time basis at a loss or without producing revenue, is sudorific to many a businessman; White Plains is showing the way.

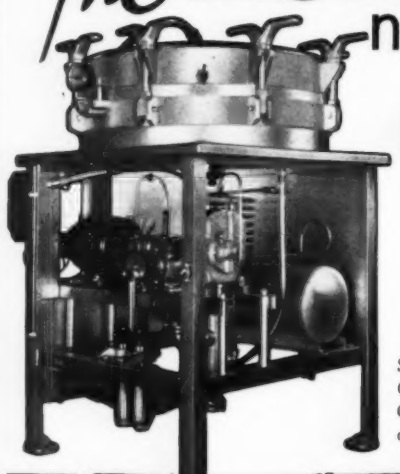
Fig. 3. Cummins twin Diesel single generator electric plant.

NEW DEVELOPMENTS

IT has been evident for years, that the program of a manufacturer cannot be limited to one type of engine – there must be a range of different sizes in so far as power output is concerned. Yet, the old method of building four or six cylinder engines in a variety of bores and stroke in order to obtain an extensive power range, is a costly one from a manufacturing and servicing standpoint.

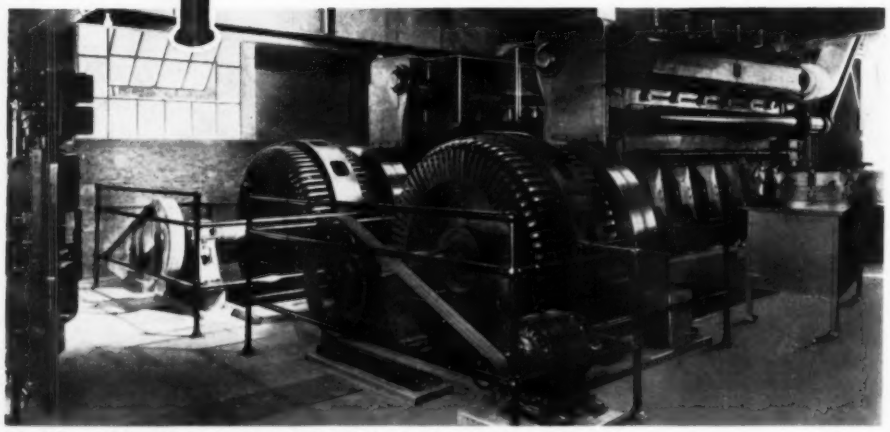
There is a distinct tendency today to concentrate on but one optimum cylinder size, and then to produce a line of engines with a range of from one to perhaps ten cylinders in-line, and with an even greater number of identicai cylinders in V formation, or double opposed.

The MODERN DIESEL NEEDS A Hilco OIL RECLAIMER

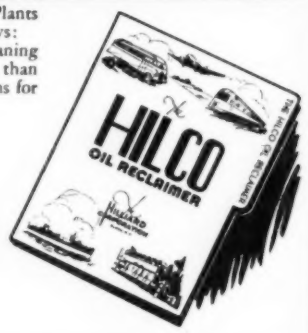


The DIESEL PROVIDES CHEAPER POWER A "HILCO" CUTS COST STILL LOWER

Says Dr C. H. Krause, Vice-President, Treas., Columbia Quarry Co., St. Louis, "We can highly recommend the Hilco Oil Reclaimer as we know it is saving us a lot of money in oil and maintenance costs"



The Hilco reclaims oil from 3 Superior Diesels in the Columbia Quarry Plants at Columbia and Valmeyer, Ill. Sup't Fred A. Krewer, at Valmeyer, says: "The Hilco process is very simple and good oil is easy to obtain. In cleaning out our engine we note that the reclaimed oil makes less sludge and carbon than the new oil. After eleven months of operation, we have yet to pull pistons for cleaning or sticking rings."



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OIL RECLAMATION
BY THE HILCO OIL RECLAIMER

WRITE to THE HILLIARD CORPORATION
122 FOURTH ST., ELMIRA, N.Y.

Sales agencies available in some territory for the Hilco Oil Reclaimer—*Use Quickmail Coupon No. 25*

This requires a multitude of crankshafts, and, ball, roller and needle-bearings seem to win favor for connecting rod and journal bearings, especially for two-cycle engines. A European manufacturer has solved this problem in a unique manner by means of built-up crankshafts. The arrangement is shown in Fig. 1.

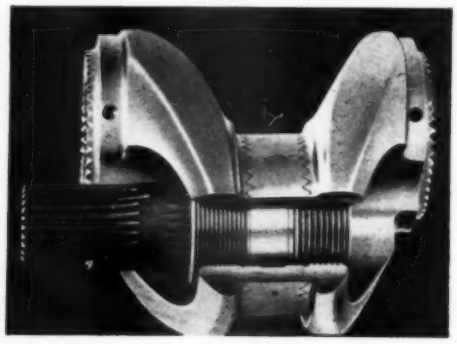

Fig. 1 Built-up crankshaft, one to 16 cylinders.

As may be seen, a crank-throw consists of three parts, held in position by serrations and held together by an internal threaded sleeve. The tubular wrench used for tightening or loosening is also shown.

While this may seem a highly sophisticated arrangement, filigrane in its execution, it has performed exceptionally well in actual practice. A European racing car equipped with a 16-cylinder gasoline engine employing this type of crankshaft (with counterweights), has been victorious in international meets abroad and in the U.S.A.; the crankshaft has successfully withstood engine speeds in excess of 4,500 rpm. for hours on end.

The crankshaft of a six-cylinder engine consists of no less than 26 parts, all produced in series and interchangeable so that they can be used for crankshafts of from one to 16 cylinders. While the production costs would be high in small quantities, for modern mass-production methods this type of construction is said to be actually cheaper than a multitude of individually forged shafts of various crank layouts.

And for larger Diesel engines (200 to 500 hp. per cylinder), this construction, so it is claimed, is the most logical and cheapest, since large crankshafts are not only costly to machine but also present great difficulties in handling in a lathe. Individual crank parts, held in a counter-weighted chuck, may be machined at high-speed.

QUICK MAIL SERVICE
PATENT PENDING — LOUIS GALTER

Interested in Diesel driven generators. Details given on my letterhead enclosed.

DIESEL PROGRESS (1)

MR. H. A. ERB
Ridgway Works
Elliott Company
RIDGWAY, PA.

Interested in air filters. Details of my Diesel equipment given on enclosed letterhead.

DIESEL PROGRESS (2)

Mr. W. K. Gregory
American Air Filter Co.
280 CENTRAL AVE.
LOUISVILLE, KY.

Interested in Diesel engines. Details given on my letterhead enclosed.

DIESEL PROGRESS (3)

Mr. R. L. Neiswander
Buckeye Machine Co.
LIMA, OHIO

Interested in Diesel driven generators. Details of requirements appear on my letterhead enclosed.

DIESEL PROGRESS (4)

MR. R. L. GIBSON
General Electric Company
SCHENECTADY, N. Y.

Interested in distant-reading tank gauges. Details my Diesel plant on letterhead enclosed.

DIESEL PROGRESS (5)

Mr. T. J. Nedderman
Petrometer Corp.
1 STAR SQUARE
LONG ISLAND CITY, N. Y.

Interested in Diesel engines. Details given on my letterhead enclosed.

DIESEL PROGRESS (6)

Mr. Paris E. Letsinger
Cummins Engine Co.
COLUMBUS, INDIANA

Interested in distant-reading tank gauges. Details my Diesel plant on letterhead enclosed.

DIESEL PROGRESS (7)

Mr. H. C. Cullinan
Liquidometer Corp.
36-16 SKILLMAN AVE.
LONG ISLAND CITY, N. Y.

Details of Diesel engines operated on my letterhead enclosed. Send a field man to see me.

DIESEL PROGRESS (8)

THE MACMILLAN PETROLEUM CORP.
530 WEST 6th ST.
LOS ANGELES, CALIF.

Interested in Diesel driven generators. Details of requirements appear on my letterhead enclosed.

DIESEL PROGRESS (9)

MR. J. F. SWEENY
DEPT. 7N
Westinghouse Elec. & Mfg. Co.
EAST PITTSBURGH, PA.

Interested in electric tachometers. Details of requirements appear on my letterhead enclosed.

DIESEL PROGRESS (10)

MR. S. CASSEY
Weston Electrical Instrument Co.
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Interested in hoisting equipment. Details of Diesel engines operated appear on my letterhead enclosed.

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MR. E. J. BYRNE
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Interested in Diesel engine bearings. Details given on my letterhead enclosed.

DIESEL PROGRESS (12)

Mr. Peter Lambertus
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420 NO. HARDING STREET
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Interested in Diesel engines. Details given on my letterhead enclosed.

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MR. CARL BEHN
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Superior Engine Div.
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Interested in Diesel powered yachts 38 ft. and over. Details on my letterhead enclosed.

DIESEL PROGRESS (14)

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Details of my Diesel plant as requested in your advertisement are given on my letterhead enclosed.

DIESEL PROGRESS (15)

MR. F. L. GERIN
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Interested in Pyrometers. Details of Diesel engines operated appear on my letterhead enclosed.

DIESEL PROGRESS (16)

MR. M. D. PUGH
Illinois Testing Laboratories, Inc.
423 NO. LA SALLE STREET
CHICAGO, ILLINOIS

Interested in Diesel engines. Details of requirements appear on my letterhead enclosed.

DIESEL PROGRESS (17)

MR. E. T. FISHWICK
Worthington Pump and Machinery Corp.
HARRISON, NEW JERSEY

Details of Diesel engines operated on my letterhead enclosed. Send a field man to see me.

DIESEL PROGRESS (18)

MR. W. I. NUNN
Standard Oil Co. (Ind.)
910 SO. MICHIGAN AVE.
CHICAGO, ILLINOIS

Details of Caterpillar Diesel engines operated on my letterhead enclosed. Send a field man to see me.

DIESEL PROGRESS (19)

Standard Oil Company of California
Room 1503
225 BUSH STREET
SAN FRANCISCO, CALIF.

Interested in Diesel schools. Information regarding my requirements appear on my letterhead enclosed.

DIESEL PROGRESS (20)

Mr. Ralph Hemphill
Hemphill Diesel Schools
BANK OF AMERICA BLDG.
GLENDALE, CALIFORNIA

Interested in Purolator filters. Details of requirements appear on my letterhead enclosed.

DIESEL PROGRESS (21)

MR. W. M. KANE
Motor Improvements, Inc.
365 FRELINGHUYSEN AVE.
NEWARK, N. J.

Interested in intake and exhaust silencers. Details on my letterhead enclosed.

DIESEL PROGRESS (22)

MR. E. A. SIPP
Burgess Battery Company
500 W. HURON ST.
CHICAGO, ILLINOIS

Interested in Maxim silencers. Details of requirements appear on my letterhead enclosed.

DIESEL PROGRESS (23)

MR. FRANK L. ORR
The Maxim Silencer Co.
50 CHURCH ST.
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Interested in Pyrometers. Details of Diesel engines operated appear on my letterhead enclosed.

DIESEL PROGRESS (24)

MR. E. F. KINSON
Wheelco Instruments Co.
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CHICAGO, ILL.

Interested in oil reclamation. Details of engines operated A.C. or D.C. voltage appear on my letterhead enclosed.

DIESEL PROGRESS (25)

Mr. T. A. LaBrecque
The Hilliard Corporation
102 WEST FOURTH ST.
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Interested in both lube and fuel oil filters. Details on my letterhead enclosed.

DIESEL PROGRESS (26)

WM. W. NUGENT & CO., Inc.
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Interested in Diesel engines 750-hp. and over. Details of requirements appear on my letterhead enclosed.

DIESEL PROGRESS (27)

Mr. R. W. Bayerlein
Nordberg Mfg. Co.
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Interested in super filter. Details of my Diesel plant on letterhead enclosed.

DIESEL PROGRESS (28)

Mr. James H. Skinner
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DETROIT, MICH.

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DIESEL PROGRESS (29)

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Socony-Vacuum Oil Co., Inc.
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NEW YORK CITY

Interested in Diesel engines. Details of requirements appear on my letterhead enclosed.

DIESEL PROGRESS (30)

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Full details of vibration problems I wish solved appear on my letterhead enclosed.

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Interested in hydraulic dynamometers. Details of my requirements appear on letterhead enclosed.

DIESEL PROGRESS (32)

MR. R. L. KUSS
Taylor Manufacturing Corp.
2330 WEST CLYBOURN ST.
MILWAUKEE, WISC.

Interested in Diesel engines. Details of requirements appear on my letterhead enclosed.

DIESEL PROGRESS (33)

MR. T. F. HUDGINS
Cooper-Bessemer Corp.
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Interested in lube and fuel purification. Details my Diesel plant on letterhead enclosed.

DIESEL PROGRESS (34)

MR. G. W. CRAMER
Goulds Pumps, Inc.
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Interested in Diesel engines. Details of my requirements appear on letterhead enclosed.

DIESEL PROGRESS (35)

Mr. F. H. Kilberry
Atlas Imperial Diesel Engine Co.
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Interested in small Diesel engines. Details of my requirements appear on letterhead enclosed.

DIESEL PROGRESS (36)

MR. LEE MADDEN
Stover Mfg. & Engine Co.
FREEPORT, ILLINOIS

Stick this coupon on a postcard or envelope and mail. Please give the advertiser as much information as possible on your present Diesel plant or your requirements, plus your name, position and address. The more data you send them the quicker and better they can serve you.

HUGE OIL FILTER RUNS 7½ BARRELS PER MINUTE

Purolator units in Imperial Valley largest ever built by company

THE All-American Canal, part of the gigantic system developed to irrigate the Imperial Valley of Southern California, has been the scene of several achievements of tremendous interest to the Diesel world.

Still another important advance has been registered in the construction of filtering units for the oil used in lubrication of three new Diesel engines at Brawley, California.

The Brawley stand-by electric power plant uses Hamilton M.A.N. single-acting, trunk-piston, two-cycle, six-cylinder Diesel engines, developing 2,250 hp. each at 240 rpm. For the lubricating system on these engines, Motor Improvements, Inc., has built the largest Purolator oil filters ever made by this company.

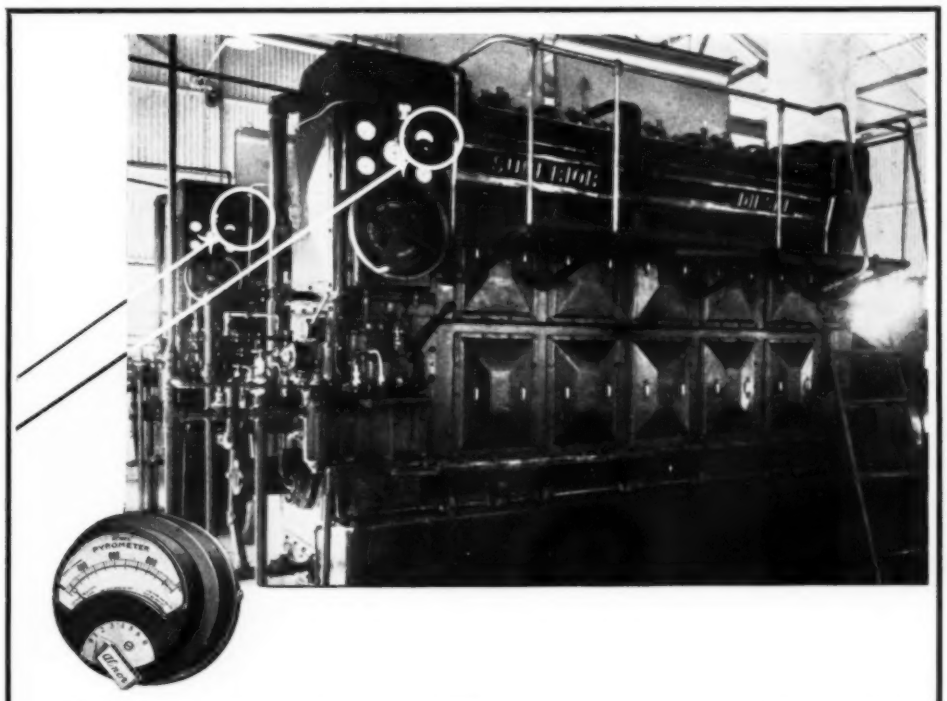
It is believed, also, that these oil filters are by far the largest in use anywhere. Each unit can filter 7½ barrels of oil per minute — or enough to lubricate the average passenger car for over fifteen years, allowing for an oil change every 1,000 miles, and one quart of make-up oil between changes.

The new filter is known as the D-91J Purolator. Each is of the duplex type, having two filtering elements in two separate sumps, with a control valve which makes it possible to pass the entire flow of oil through either element. This design makes continuous runs possible since it would not be necessary to shut down the engine in order to make periodical inspections of the filtering elements.

Each D-91J Purolator stands four feet high, is two and one-half feet across the front, and nearly three feet deep, but weighs only 1,450 lbs. when constructed of cast iron and commercial materials.

Each filtering element is of the Purolator metal edge construction and will positively remove all particles .005″ of an inch or larger from the oil stream. When contamination builds up on the outside of the filtering element it can be removed by a knife cleaning device which is operated by turning the handle on top of the filter. The dirt then settles to the bottom of the sump and can be flushed out through the drain plug.

385 gpm. of SAE 40 lubricating oil at 140°F. can be put through either element, yet with a loss of pressure across the filter of no more than four pounds per square inch.



Alnor Exhaust Pyrometers Used Extensively for Pipe Line Service

WHEREVER you find Diesels that must give continuous, hard service at minimum cost, there you will invariably find Alnor Exhaust Pyrometers to insure maximum engine efficiency and economy.

In the view above is shown a pair of 5-cylinder 315 hp. Superior Diesel engines, each equipped and served by an Alnor Round Type Exhaust Pyrometer.

These Diesels are used to drive centrifugal pipe line pumps through Falk increasers.

In the Alnor line is a type and size of pyrometer to suit every size Diesel. It will pay you to get full information.

Use Quickmail Coupon No. 16 for Complete Catalog.

ILLINOIS TESTING LABORATORIES, Inc.
423 NO. LaSALLE ST. CHICAGO, ILLINOIS
TESTING ENGINEERS AND MANUFACTURERS
"Alnor" and Price Measuring Instruments
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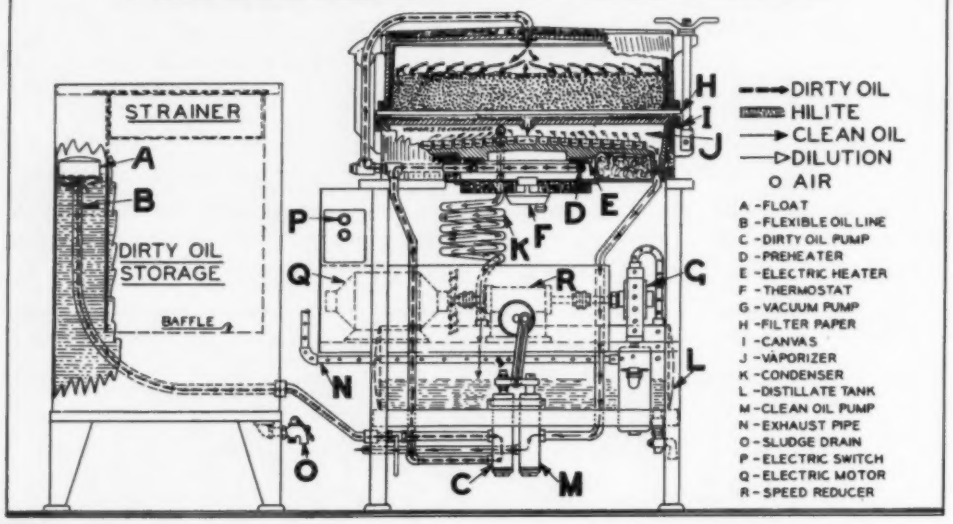
THE HILCO OIL RECLAIMER



THE Hilco Oil Reclaimer is represented as a simple, economical and foolproof method of restoring used lubricating oil to the full value of new oil. The reclaimer may be either directly connected to the lubricating system of the Diesel engine or it may also be operated as a batch reclaimer. In the latter case, the operator drains the engine's lube oil and delivers it to a dirty-oil receiving tank from which the Hilco Oil Reclaimer draws its supply.

The Hilco is all-electric, automatic and continuous in operation, requiring attention but once during a 24-hour period, for the renewing of the filter material. The material used as a filtering agent is Fullers earth, which, by a process of "adsorbtion" it is claimed, removes all carbon, sludge, resins, gums, acidity and restores the color. The filtering material is being marketed under the trade name of Hilite. The last traces of moisture and fuel dilution are said to be removed by evaporation in a vacuum chamber, which removes the diluents at a low temperature.

In the diagrammatic picture, Fig. 1, "G" indicates the vacuum pump driven by the electric motor "Q". This motor also drives through the speed reducer and eccentric "R", the dirty-oil pump "C" and the clean oil pump "M." The float "A" supports the flexible oil hose "B" which delivers the dirty-oil to pump "C" which in turn forced the dirty-oil through the pre-heater "D". The latter is in contact with the electric heating element "E" which is regulated by the thermostat "F". The vacuum pump "G" draws the dirty-oil through the Hilite filtering agent and through the filter paper "H" and the canvas "I". Subsequently the oil enters the vaporizer "J", where its temperature is kept at 380° F., and where moisture and fuel dilutions are removed from the oil. The temperature being kept low enough so that no "cracking" can take place. The removed dilutions pass out at the condenser "K" and finally drop into the distillate receiver "L". The "clean oil" flows to plunger pump "M" where it is pumped into drums or storage tanks. If the Hilco Oil Reclaimer is directly piped to the Diesel engine, the dirty-oil storage tank is not needed. For further information use Quickmail Coupon No. 28.

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WHY do most Diesel engine builders specify American-Bosch Fuel Injection Equipment? 3 reasons why:

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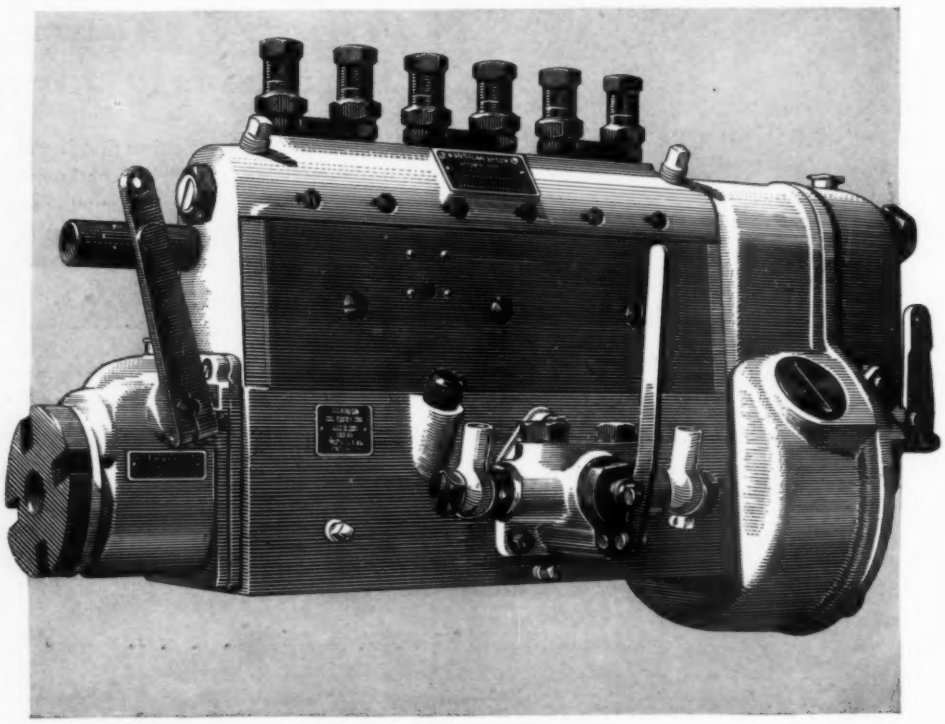
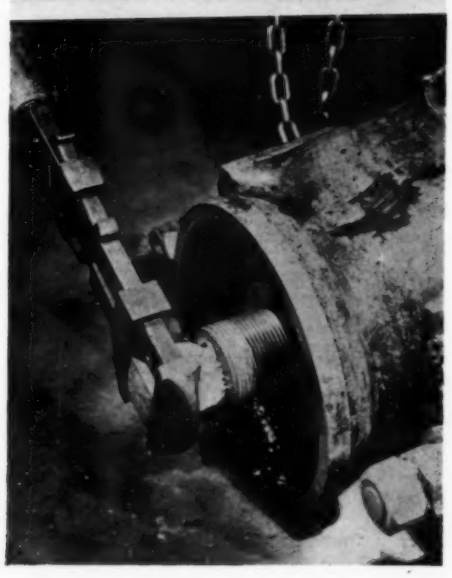


THE Reps Extractor answers the Diesel industry's age-old riddle of extracting broken pipe and studs.

The patented four-point grip prevents Reps Extractor from reaming and assures strong bite without hammering or pounding. Shallow grip greatly lessens any expansion and jamming.

Built-in reamer automatically removes burrs from pipe, eliminating interference with Extractor's bite and minimizing cause for expansion of broken piece. The Reps Extractor pulls rather than reams.



Broken pieces of pipe are removed by inserting the Reps Extractor straight into the pipe so all four points bite at the same time. Turn the Extractor with a wrench in the direction of the Extractor's threads. To remove studs, screws or bolts, drill a hole in the exact center of broken part just deep enough for the Reps Extractor to get its shallow grip.

The complete set of only 10 Reps Extractors fits every size and class of pipe, standard, heavy or extra heavy, from ⅛" to 2". This same set of tools fits every size of studs, screws and bolts from 7/16" to 3½". Write Editor, DIESEL PROGRESS, 2 West 45th St., New York, N. Y., for additional details.

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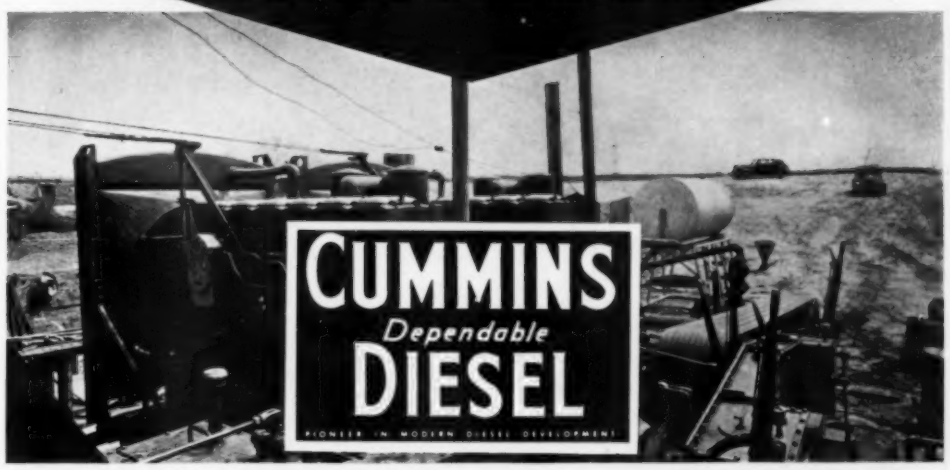

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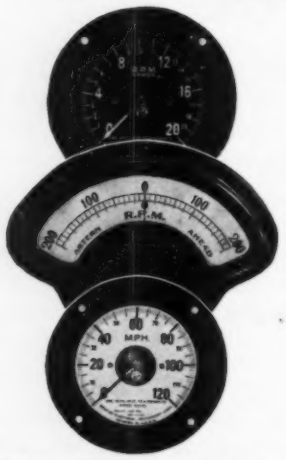

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WESTON *Instruments*

SANTA FE TRAINS

. . . . *Continued from page 24* . . . .

Second *Super Chief* consists of a 3,600 hp. EMC Diesel locomotive; a baggage car, a roomette car, four various types of closed (room) and open sleepers; a room-observation sleeper; club-cocktail lounge-dormitory car, and a 36-seat dining car.

The two *El Capitans* consist of a 1,800 EMC Diesel locomotive; a baggage chair car; a lunch counter dining car, two chair cars with smoking lounges; and a chair observation car. The above trains operate, together with the first *Super Chief,* out of Chicago each Tuesday and Saturday, and from Los Angeles each Tuesday and Friday, about four hours apart from terminals.

The *San Diegan* consists of a 1,800 hp. EMC Diesel locomotive, a baggage-mail car; three chair cars; a lunch-tavern car and a parlor-observation car.

The *Kansas Cityan-Chicagoan* (two full trains), consist of 1,800 hp. EMC Diesel locomotives; baggage-express cars; three chair cars, club-chair cars; dining car seating 48; parlor-observation cars.

The Chicago-Kansas City-Wichita, Kans., trains operate one through trip each morning out of Chicago at 9:30 and arrive at Kansas City at 5 P.M. and Wichita at 9:15 P.M., with approximately the same schedule observed eastbound in the morning from Wichita to Chicago. The operating schedule is 663 miles in 705 minutes including all stops (11 stops and a 15-minute stop-over in Kansas City), which is considered pretty fast time.

EDITOR'S NOTE:

After a four-year legal battle, the California Railroad Commission has approved the application of the Atchinson, Topeka & Santa Fe for the operation of intrastate bus service between various points in California. This long awaited decision on the part of the California Railroad Commission marks the end of the longest and most bitterly contested case ever heard by that body.

The final adjudication in favor of the Santa Fe has been the impetus for the inauguration of the San Francisco-Los Angeles combined rail-bus service via the Trans-Bay bridge. The Santa Fe is thus in direct competition with the Southern Pacific rail-bus service via the coast route. The former, due to its Dieselized equipment, brings the running time between San

Francisco and Los Angeles down to but 9 hr. 35 min., whereas the coastal route of the Southern Pacific's best rail time is 9 hr. 45 min.

The Santa Fe intends to establish a completely co-ordinated service permitting interchange of all bus and rail-coach tickets. The uniform rate has been fixed at 1½c per mile and unlimited stop-over privileges are granted as a matter of course. Under this rate, the fare between San Francisco and Los Angeles will be but $6 one way, as compared with the present lowest all-rail coach rate of $9.75, and the present lowest bus fare of $6.75. All in all, this is another instance where the Diesel engine has been instrumental in speeding up service schedules, lowering operating costs, and reducing fares.

"WESTERN EXPLORER"

. . . . *Continued from page 45* . . . .

Accommodations for a crew of 14 are placed on the main deck, with a two-berth Captain's room followed by large crew quarters in the middle of the main deckhouse. The crew's quarters are finished in Philippine mahogany and have neat drapes, good lighting, linoleum tile flooring and ample locker space. The galley, aft, is very large and has hot and cold running water, tile floors, large Frigidaire icebox stores and modern plumbing. An oil burning range is also supplied.

When President Roosevelt and United States Fishing Commissioner Bell greet the *Western Explorer* early in June at Washington, D. C., for an extended inspection by maritime and fisheries officials, the West, at last, will have arrived in the East. Outboard, the shiny white hull, roomy outdoor pilot house in front of the closed pilot house, which has sleeping accommodations for two, besides chart and radio space, the traditional Crow's Nest atop the tall Fir spar – for spotting fish at sea – will give the Chesapeake Bay fishermen a real taste of what, exactly, IS a West Coast fishing vessel of the de luxe type.

If successful, the *Western Explorer* will probably be followed by more of Messrs. Hervey and Martin Petrich's craft. And the Gloucester fishermen will have learned how to handle a Purse Seiner net and probably, as a result, will learn how to catch fish more quickly than they have ever done before.

As this article is written, the *Western Explorer* is reported off the Mexican Coast, a sixth of her 7,000-mile voyage already finished without mishap.

DIESEL PROGRESS

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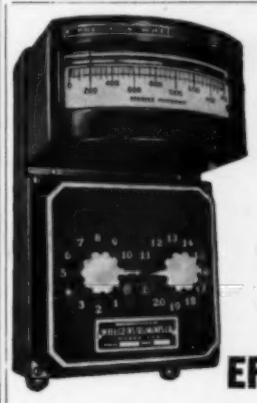

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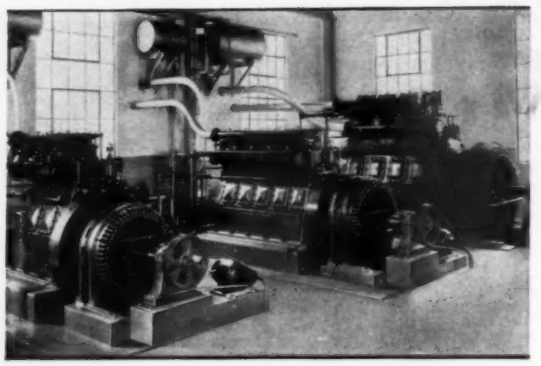

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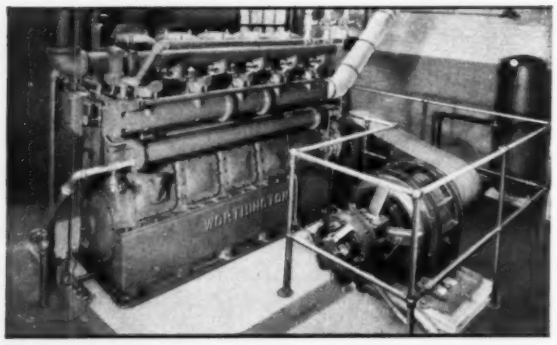

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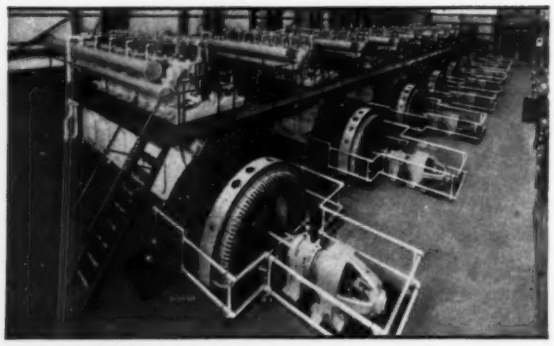

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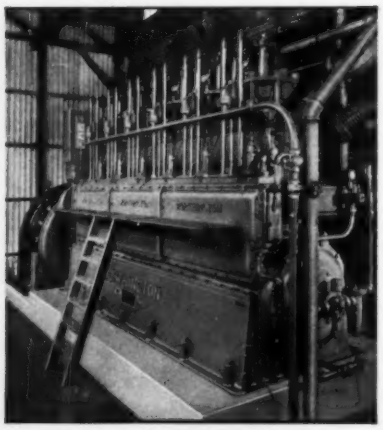

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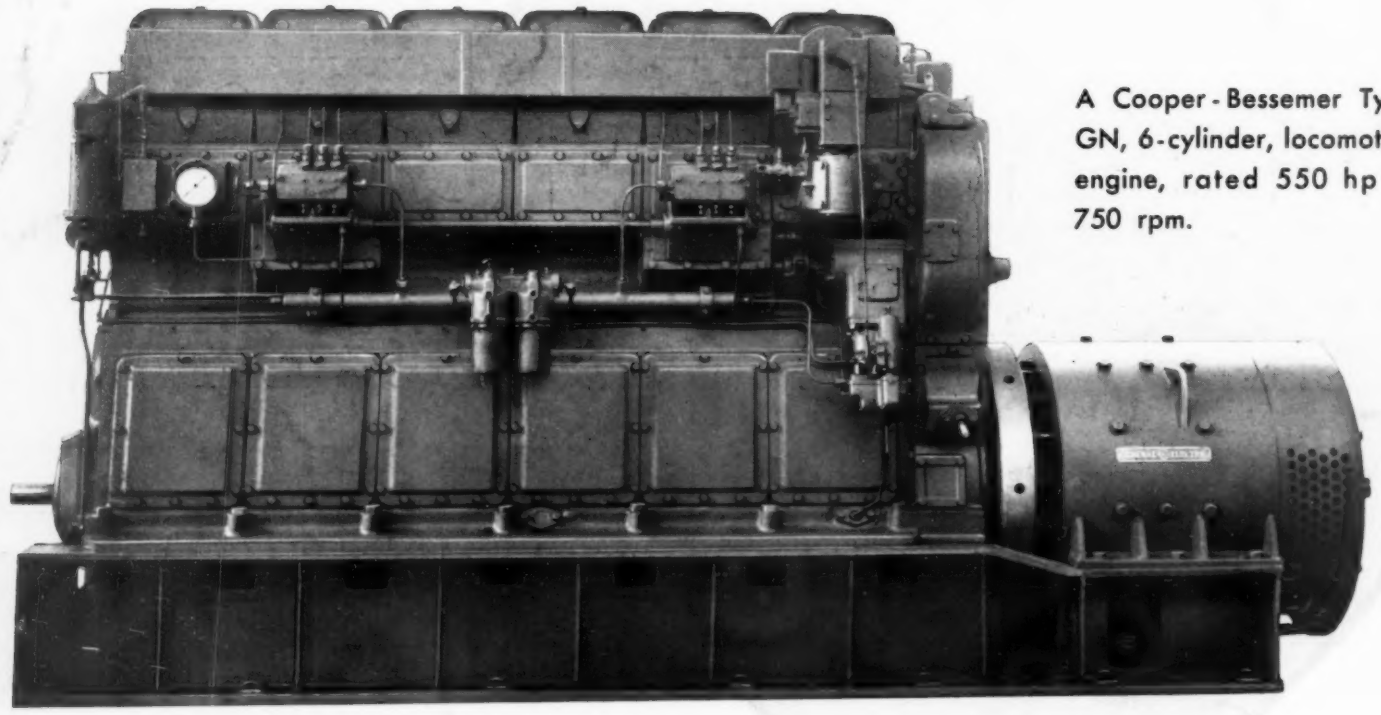

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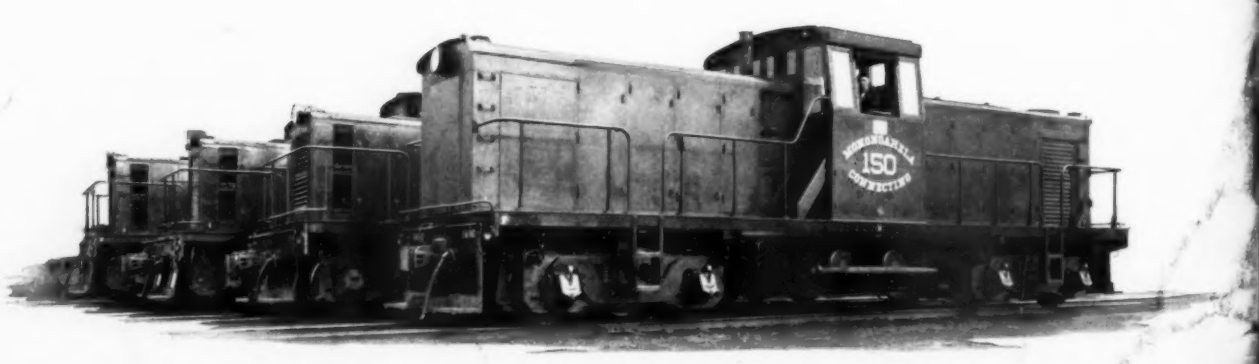

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